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Volume 29
Number 2

Mariners Weather Log

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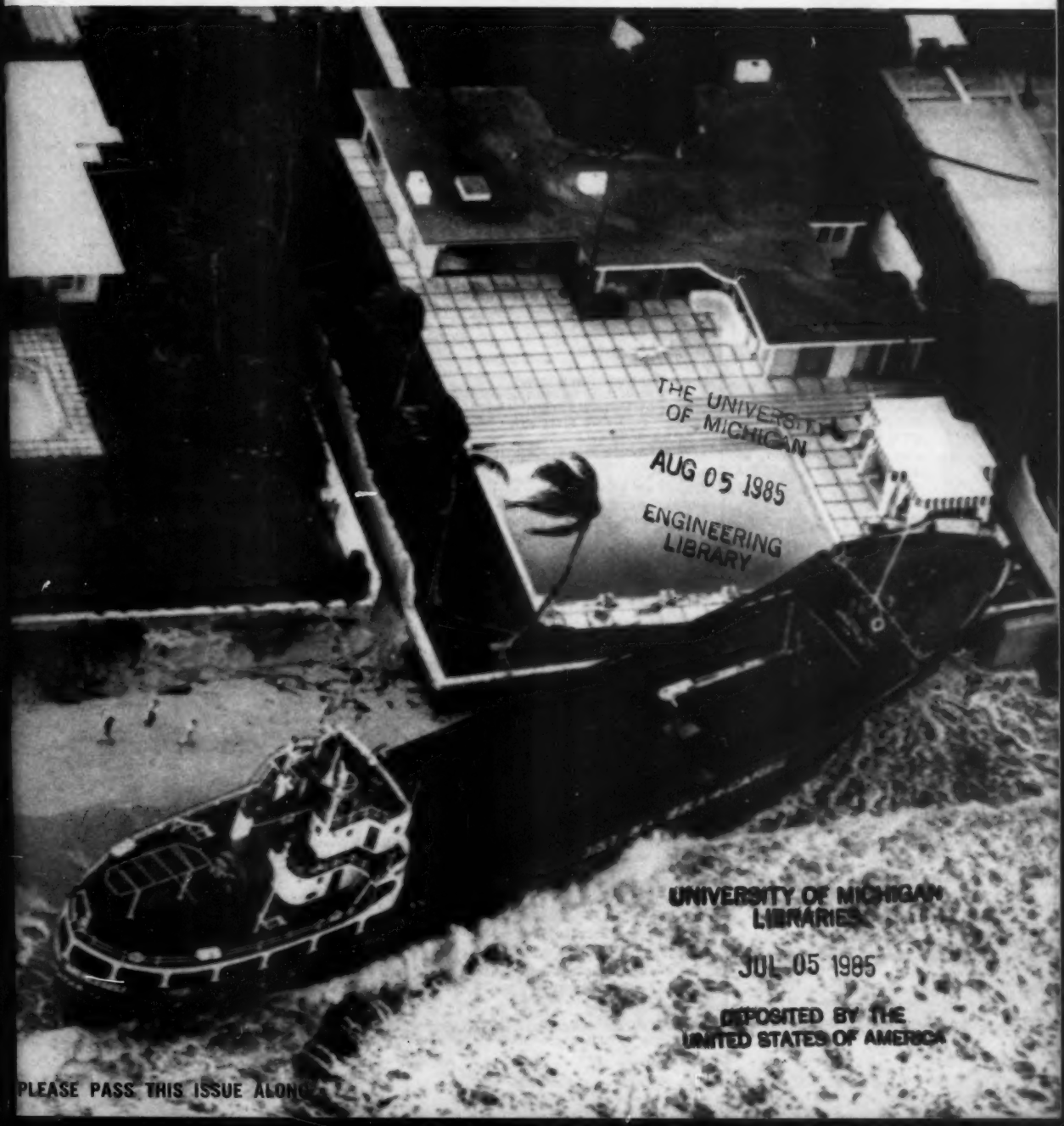

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Mariners Weather Log

Editor: Elwyn E. Wilson

April-May-June 1985
Volume 29, Number 2
Washington, D.C.

Front Cover: The MERCEDES 1 dragged her anchor and was blown ashore at Palm Beach, Florida before she could start her engines on November 23, 1984. All crew members walked off the ship to safety. WIDE WORLD PHOTO.

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The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1.1986.

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Mariners Weather Log

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EASTERN NORTH PACIFIC TROPICAL CYCLONES, 1984

EASTERN NORTH PACIFIC TROPICAL CYCLONES OF 1984
E.B. Gunther and R.L. Cross
Eastern Pacific Hurricane Center
NOAA, National Weather Service
Redwood City, CA

The 1984 eastern North Pacific tropical cyclone season began on 17 May with tropical storm Alma and ended 173 days later with tropical depression 24 on 5 November. Table 1 shows the monthly distribution of 1984 tropical cyclone activity and tables 2 and 3 compare this activity with that of recent years. The 1966-84 period was chosen for comparison since it probably includes all tropical cyclone activity in the area due to the excellent satellite coverage since 1966. Prior to that time, some tropical cyclone activity went undetected due to sparsity of data in the tropics. A summary of the important features of the 1984 season is given in tables 4 and 5. Cyclone tracks are shown in figures 1 to 4.

Table 1.-- Monthly distribution of eastern North Pacific tropical cyclones, 1984

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tropical depressions	0	1	1	1	2	0	1	0	6
Tropical storms	1	0	1	2	0	2	0	0	6
Hurricanes	1	3	2	2	4	0	0	0	12
Total	2	4	4	5	6	2	1	0	24

* Cyclones are ascribed to the month in which they began.

Table 2.-- Frequency of eastern North Pacific tropical storms and hurricanes by months and years.

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1966	0	1	0	4	6	2	0	0	13
1967	0	3	4	4	3	3	0	0	17
1968	0	1	4	8	3	3	0	0	19
1969	0	0	3	2	4	1	0	0	10
1970	1	3	6	4	1	2	1	0	18
1971	1	1	7	4	2	2	1	0	18
1972	1	0	1	6	2	1	1	0	12
1973	0	3	4	1	3	1	0	0	12
1974	1	3	3	6	2	2	0	0	17
1975	0	2	4	5	3	1	1	0	16
1976	0	2	4	4	3	1	0	0	14
1977	1	1	1	1	3	1	0	0	8
1978	1	3	4	6	2	2	0	0	18
1979	0	2	2	2	1	2	1	0	10
1980	0	3	3	2	2	2	0	0	14
1981	1	1	3	4	2	4	0	0	15
1982	1	1	6	5	4	2	0	0	19
1983	1	1	6	3	5	3	1	1	21
1984	2	3	3	4	4	2	0	0	18
Total	11	34	70	75	55	37	6	1	289
Average	0.6	1.8	3.9	3.9	2.9	1.9	0.3	0.1	15.2

* Cyclones are ascribed to the month in which they began.

Forecasters at the Eastern Pacific Hurricane Center (EPHC) issued 585 tropical cyclone advisories during the 1984 season. Comparisons with recent years are given in table 5. Advisories were issued four times daily on a regularly scheduled basis for cyclone positions at 00000, 0600, 1200, and 1800 GMT. The Central Pacific Hurricane Center (CPHC) in Honolulu, Hawaii issued additional advisories on three of the 1984 tropical cyclones that moved across 140°W longitude and into the CPHC's area of forecast responsibility.

Table 3.-- Frequency of eastern North Pacific hurricanes by months and years

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1966	0	1	0	4	2	0	0	0	7
1967	0	1	0	2	1	2	0	0	6
1968	0	0	0	3	2	1	0	0	6
1969	0	0	1	1	1	1	0	0	4
1970	1	0	1	1	0	1	0	0	4
1971	1	1	3	2	2	1	0	0	10
1972	1	0	0	6	1	0	0	0	8
1973	0	1	3	0	2	1	0	0	7
1974	0	2	2	4	2	1	0	0	11
1975	0	1	2	3	1	1	0	0	8
1976	0	2	1	2	3	0	0	0	8
1977	0	0	1	1	1	1	0	0	4
1978	1	2	3	4	1	1	0	0	12
1979	0	1	1	2	1	1	0	0	6
1980	0	2	2	2	1	0	0	0	7
1981	0	1	1	3	1	2	0	0	8
1982	0	0	4	3	3	1	0	0	11
1983	1	1	2	2	3	2	0	1	12
1984	1	3	2	2	4	0	0	0	12
Total	6	19	31	47	32	17	0	1	153
Average	0.3	1.0	1.6	2.5	1.7	0.9	0.0	0.1	8.1

* Cyclones are ascribed to the month in which they began.

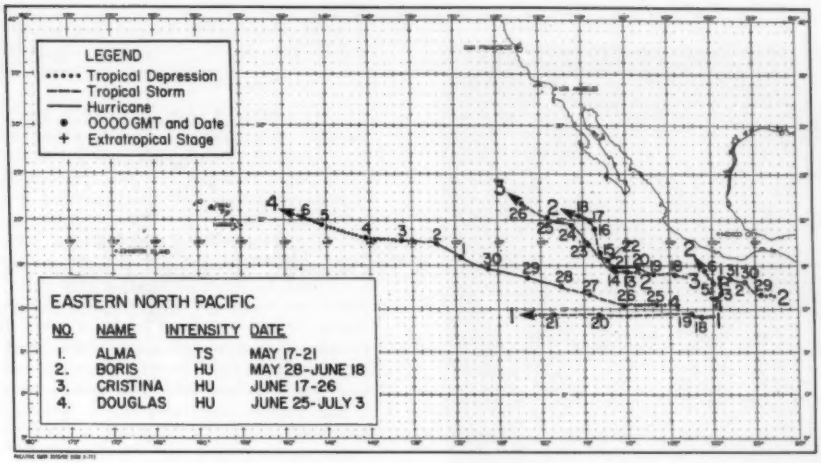
Although six of the tropical cyclones moved onshore along the Mexican coast during the 1984 season and some ships passed close to the centers of tropical cyclones, no reports of casualties or damage were received. Of the six cyclones to move onshore, only two had winds in excess of 30 kn. The first of the two, hurricane Odile, moved onshore with rapidly diminishing 50 kn winds 40 mi northwest of Zihuantanejo, Mexico on 22 September. Four days later hurricane Norbert, with 55 kn winds, moved onshore near Point Abreojos, midway up the west coast of Baja California. Of the remaining tropical cyclones to move onshore, two were hurricanes that had weakened to the tropical depression stage by the time they reached the coast and two were weak, short-lived tropical depressions with 30 kn winds near their centers.

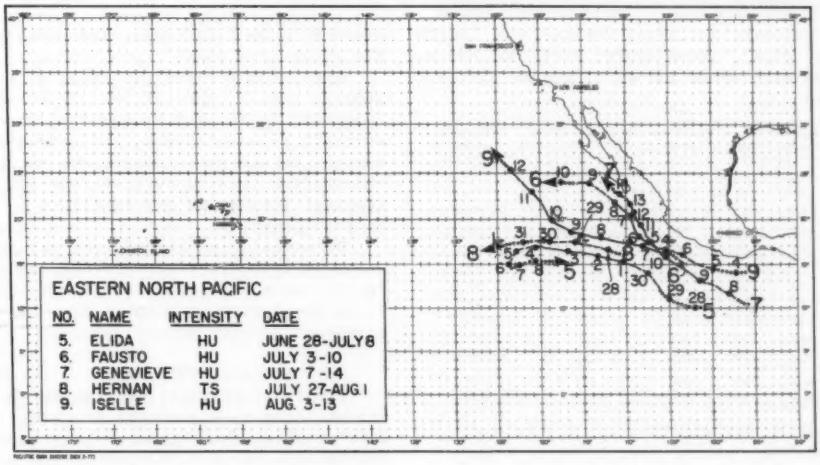
The National Weather Service Satellite Service Field Station, collocated with the EPHC, provided excellent satellite coverage during the 1984 season. The loss of the GOES East geostationary satellite and the subsequent movement of the GOES West satellite from 135°W longitude to 98°W longitude had little effect on overall EPHC operations. Visual and infrared satellite imagery was available from the GOES and polar-orbiting NOAA satellites. Detail on

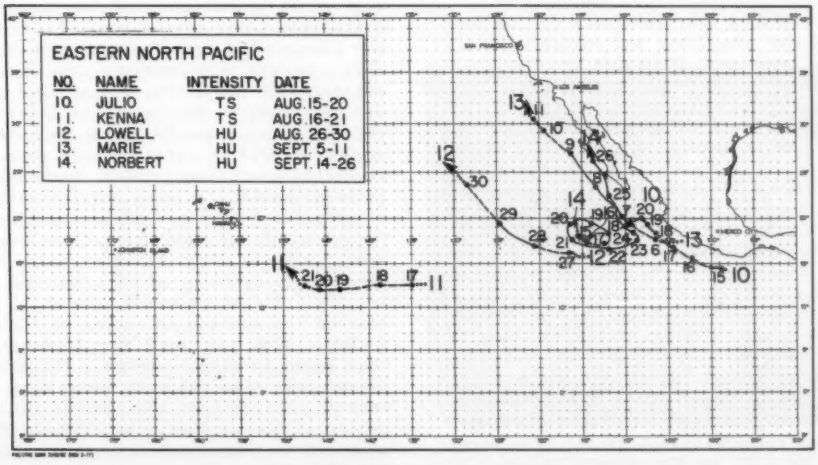
Table 4.-- Eastern North Pacific tropical cyclones, 1984. All times GMT, latitudes north, longitudes west, HU = hurricane, TS = tropical storm, TD = tropical depression

Cyclone	Depression	Storm	Hurricane	Storm	Depression	Final Position	Maximum Wind m/s(kt)	From	To
TS Alma 17-21 May	171800 09.0-099.8	181200 09.2-104.3			211800 09.6-121.3	211800 09.6-121.3	26(050)	191200 09.5-110.5	201800 09.5-117.6
HU Boris 28 May-18 Jun	281800 11.6-094.0 121800 14.1-109.9	290000 11.7-094.6 131500 14.1-110.8	301200 13.4-097.1	301800 13.5-097.6	011800 13.2-099.3 171200 20.2-114.6	060600 14.8-101.6 180000 20.3-115.4	34(065) 26(050)	301200 13.4-097.1 140000 14.3-111.2	301800 13.5-097.6 141800 15.6-112.6
HU Cristina 17-26 Jun	170600 14.0-103.3	171200 14.0-103.6	191800 14.4-108.2 240000 19.4-116.2	211800 15.1-112.1 241800 20.1-118.3	251800 21.0-121.9	260000 21.5-122.6	46(090)	201200 14.8-110.2	210000 14.5-111.8
HU Douglas 25 Jun-3 Jul	250000 10.3-106.5	251800 10.4-109.3	271800 12.7-117.0	021200 17.7-134.4	030600 17.8-137.6	031200* 17.9-138.8	64(125)	290000 13.8-121.8	290600 14.0-122.8
HU Elida 28 Jun-8 Jul	280000 10.1-101.8	291200 12.5-106.3	300600 14.3-108.3	041800 16.7-122.5	060000 15.1-123.7	081800 15.8-115.8	59(115)	011200 15.7-112.0	011800 15.9-112.8
TD Six 30 Jun-2 Jul	300600 09.3-094.5					020000 09.8-099.0	15(030)	301800 09.4-096.2	011200 09.7-097.9
HU Fausto 3-10 Jul	031200 15.8-103.9	031800 16.1-104.0	041800 17.3-107.0	081200 23.3-112.7	090600 24.0-115.5	100000 23.9-117.8	49(095)	060000 18.2-108.3	061800 19.9-109.1
HU Genevieve 7-14 Jul	070600 10.5-095.5	071800 11.3-096.8	081800 12.3-100.4	120600 21.1-109.0	140000 22.7-110.8	140600 23.5-110.9	52(100)	101800 18.8-107.8	110600 20.0-108.9
TD Nine 24-25 Jul	240000 14.9-128.2					250000 15.1-133.5	13(025)	240000 14.9-128.2	250000 15.1-133.5
TS Hernan 27 Jul-1 Aug	271200 16.0-110.6	280000 16.6-112.3			301200 17.5-120.7	010000 17.1-125.1	23(045)	291200 17.5-117.6	291800 17.5-118.4
HU Iselle 3-12 Aug	031800 14.0-096.4	041800 14.4-099.3	060600 16.6-104.5	110600 23.7-121.7	120600 25.8-124.0	121200 26.4-124.2	59(115)	081800 18.3-115.5	090600 18.8-117.0
TS Julio 15-20 Aug	150000 14.5-098.8	151500 14.8-100.8			171800 17.9-105.9	201200 19.7-108.5	28(055)	170300 17.0-104.7	171200 17.6-105.5
TS Kenna 16-18 Aug	161530 12.4-133.8	170000 12.5-135.1				180600* 12.6-139.6	21(040)	171800 12.5-137.8	180600 12.6-139.6
TD Fourteen 23-26 Aug	231800 11.1-130.3					260600* 11.1-140.5	15(030)	240000 11.2-131.1	260600 11.1-140.5
HU Lowell 26-30 Aug	260600 15.6-114.1	261800 15.8-115.7	271800 16.7-120.0	290600 20.6-125.6	300000 23.8-128.7	300600 24.8-129.9	39(075)	281200 17.8-122.6	281800 18.7-123.7
HU Marie 5-11 Sep	051200 16.8-104.4	051800 17.2-105.3	070000 20.0-110.6	091200 28.6-118.0	101200 30.2-120.3	110000 30.5-120.6	41(080)	080000 23.4-113.3	081200 25.0-115.0
TD Seventeen 11-12 Sep	111800 14.5-095.6					121200 15.7-094.5	15(030)	120000 14.9-095.1	121200 15.7-094.5
TD Eighteen 14-15 Sep	140000 17.2-102.3					150000 18.8-104.0	15(030)	141800 18.5-104.0	150000 18.8-104.0
HU Norbert 14-26 Sep	141800 18.5-115.5	150000 18.1-115.5	160800 17.2-113.4	260000 26.1-113.6		260400 26.7-113.5	59(115)	210000 17.3-116.1	241800 21.5-111.1
HU Odile 17-22 Sep	171800 14.3-101.5	180000 14.5-102.2	200000 16.5-104.5	221800 18.0-102.0		221800 18.0-102.0	46(090)	220600 16.5-100.7	221200 17.0-102.0
HU Polo 26 Sep-3 Oct	260000 12.9-097.6	281800 13.0-106.2	300000 15.6-109.3	021800 22.6-113.1	030600 23.8-111.3	031200 24.5-109.9	52(100)	011200 19.4-114.1	021200 22.2-113.8
TS Rachel 7-16 Oct	071800 11.2-097.0	090600 11.8-103.0			111800 13.8-110.9	161200 15.2-119.9	28(055)	100600 12.6-105.9	111200 13.6-109.9
TS Simon 31 Oct-8 Nov	310000 13.1-098.4	010000 13.6-102.7			050000 14.2-127.4	080000 15.7-133.2	28(055)	021800 15.3-113.8	031800 14.5-120.1
TD Twenty-four 5 Nov	050600 14.6-114.3					051800 15.0-114.9	15(030)	050600 14.6-114.3	051800 15.0-114.9

* Passed to the Central Pacific Hurricane Center (CPHC).




EASTERN NORTH PACIFIC
NO. NAME INTENSITY DATE
5. ELIDA HU JUNE 28-JULY 8
6. FAUSTO HU JULY 3-10
7. GENEVIEVE HU JULY 7-14
8. HERNAN TS JULY 27-AUG. 1
9. ISELLE HU AUG. 3-13


EASTERN NORTH PACIFIC
NO. NAME INTENSITY DATE
10. JULIO TS AUG. 15-20
11. KENNA TS AUG. 16-21
12. LOWELL HU AUG. 26-30
13. MARIE HU SEPT. 5-11
14. NORBERT HU SEPT. 14-26

Figures 1-3.-- Tracks of eastern North Pacific tropical cyclones, numbers 1 to 14, May to September.

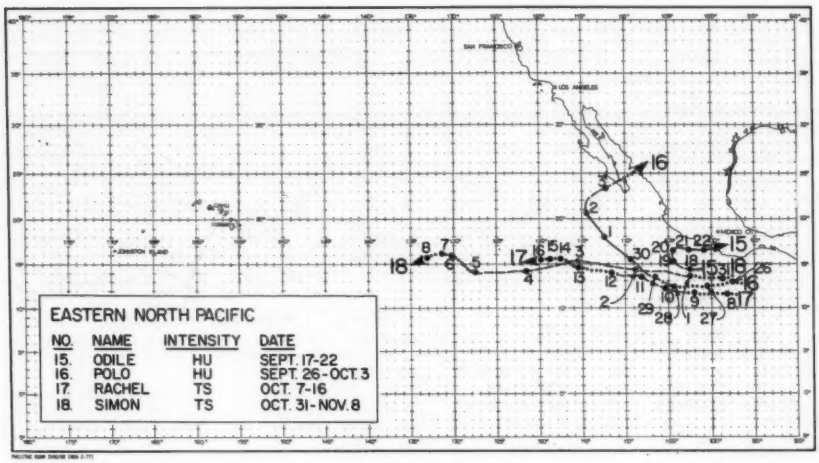

EASTERN NORTH PACIFIC
NO. NAME INTENSITY DATE
15. ODILE HU SEPT. 17-22
16. POLO HU SEPT. 26-OCT. 3
17. RACHEL TS OCT. 7-16
18. SIMON TS OCT. 31-NOV. 8

Figure 4.-- Tracks of eastern North Pacific tropical cyclones, numbers 15 to 18, September to November.

Table 5.-- Cyclones, including depressions, length of season (days), storm hours, hurricane hours, hurricanes with winds 100 kn or greater, advisories issued

	Cyclones	Length of Season	Storm Hours	Hurricane Hours	Hurricanes 55 m/s (100 kt) or greater	Advisories issued
1974	24	150	-	-	2	-
1975	20	158	-	-	4	-
1976	18	151	816	498	5	393
1977	17	152	343	128	0	193
1978	21	144	873	840	6	394
1979	13	172	482	326	4	198
1980	15	143	476	586	3	470
1981	17	153	858	432	1	309
1982	26	160	1044	774	4	509
1983	24	201	1238	1098	8	580
1984	24	173	1187	1048	6	585
Total	219	1757	7317	5730	43	3631
Average	19.9	159.7	813	637	3.9	403

satellite imagery was excellent with full disk resolution at 7 km, sector resolution at 4 km and, on request, high sector resolution at 0.9 km. The gridding of satellite imagery was accurate to within a few kilometers due to the stability of the satellites and easily identifiable landmarks. Enhanced H-curve infrared imagery was especially useful in depicting high-level cold core centers. Cyclonic intensity was calculated using the Dvorak technique of satellite analysis (Dvorak, 1973).

Reconnaissance aircraft flew into three of the 1984 cyclones as they moved up the west coast of Baja California in September and October. The first flight, with two penetrations, was made by the U.S. Air Force into hurricane Marie on 8 September. The following day, two more penetrations of the hurricane were made. The next reconnaissance flights were made by NOAA research aircraft into hurricane Norbert on 22 September. Three penetrations of the hurricane were made on that day, two the next, and three on the following day. The final reconnaissance of the 1984 season was made by the U.S. Air Force into tropical storm Polo on 2 October. Two penetrations of the storm were made.

Even though satellite imagery continues to improve and is probably one of the most important tools used by tropical forecasters, aircraft reconnaissance, and synoptic ship reports retain their importance as invaluable comparative in situ observations for both the tropical forecaster and satellite meteorologist.

Numerically generated forecast tracks for tropical cylone activity in the eastern North Pacific were available from the National Hurricane Center in Miami during the 1984 season.

TROPICAL STORM ALMA, 17-21 May

The first tropical cyclone of the 1984 season began as a disturbance on the intertropical convergence zone and moved into the Eastern Pacific from the Panama-Colombia area on 12-13 May. At that time, the westerlies were still quite strong at low latitudes. The westerlies and a strong vertical wind shear kept the disturbance from developing over the next 3 days. By the 16th, however, the westerlies had retreated to the north, a deep layer mean ridge was beginning to form along 15°N latitude, and the disturbance was beginning to move over a pocket of 30-31°C water. Under these more favorable conditions, the disturbance began to increase rapidly in size and intensity.

The first tropical depression advisory was issued on 17 May when the cyclone was centered near 9.0°N, 99.8°W. Eighteen hours later it was upgraded to tropical storm Alma near 9.2°N, 104.3°W. The storm moved west at 15 kn and reached its maximum intensity of 50 kn by 1200, 19 May. Alma continued near 50 kn for 24 hr, then began to slowly weaken. The ship MELVILLE, passed near Alma and sent three very useful weather observations that helped to locate the center of the cyclone. By 1800, 21 May Alma had weakened to a tropical depression near 9.6°N, 121.3°W. The center was dissipating rapidly and

the final advisory was issued 6 hr later when the cyclonic circulation was no longer evidence on satellite imagery.

HURRICANE BORIS, 28 MAY-18 JUNE

Boris began as a tropical depression 300 mi south of the Gulf of Tehuantepec on 28 May. Moving west-northwest over 31°C water, the cyclone reached its maximum intensity of 65 kn by 1200, 30 May near 13.4°N, 097.1°W. Boris then turned west and began to weaken slowly. By 0000, 1 June, the cyclone was near 13.7°N, 099.0°W. It then made a sharp turn to the south as an upper-level ridge replaced an upper-level, trough over western Mexico. Boris moved south for 3 days and 150 mi, then turned sharply to the north as an upper level trough once again moved over western Mexico. The cyclone was now over 27°C water and winds near the center had diminished to 25 kn. By 1200, 5 June, Boris was 150 mi south of Acapulco. It then turned west toward 26°C water and dissipated 18 hrs later near 14.8°N, 101.6°W.

Remnants of Boris drifted slowly west for 6 days, then began to redevelop again over 29°C water near 14.1°N, 109.9°W. Continuing to move west, the cyclone intensified to 50 kn by 0000, 14 June near 14.3°N, 111.2°W. Boris then turned north toward a sharp upper-level trough off the northern Baja California coast. Three days later the trough had weakened considerably and Boris once again turned westward, weakening rapidly over 26°C water. The final advisory on the cyclone was issued at 0000, 18 June with the center dissipating near 20.3°N, 115.4°W. Weather observations from the following ships were helpful in locating, tracking and analyzing Boris; AMERICAN TITAN, JYOJIN MARU, JUPITAL No. 2, MEERDRECHT, ROSEMARY, SERGEY YESININ, SHIN-YU MARU, KADO, KRAC, and 7JYM.

HURRICANE CRISTINA, 17-26 JUNE

Tropical cyclone 3 formed early on 17 June over 29°C water 300 mi southwest of Acapulco. A weak upper LOW was centered in the souther Gulf of Mexico on 16 June. The LOW moved slowly west over the next several days, apparently acting as a trigger for the formation of tropical cyclone 3. Also on the 16th, an upper-level ridge extended southwest from Oklahoma through Cabo Corrientes and an upper-level trough extended southward from southern California. Both of these features retrogarded slowly throughout the lifetime of Cristina.

Cristina quickly intensified to a tropical storm by 1200, 17 June near 14.0°N, 103.6°W. She moved west at 4-6 kn and slowly intensified. At 1800, 19 June, the storm accelerated to 7 kn westward and intensified to a 70 kn hurricane. Cristina reached maximum intensity on the 20th with 90 kn winds, (fig. 5).

On the 21st at 0000, Cristina turned abruptly northward on the west side of the upper-level ridge. Weakening began immediately as the storm came under the influence of the upper-level trough off the west coast of Baja California. Cristina dissipated at 0600, 26 June when centered about 750 mi west of Cabo San Lucas

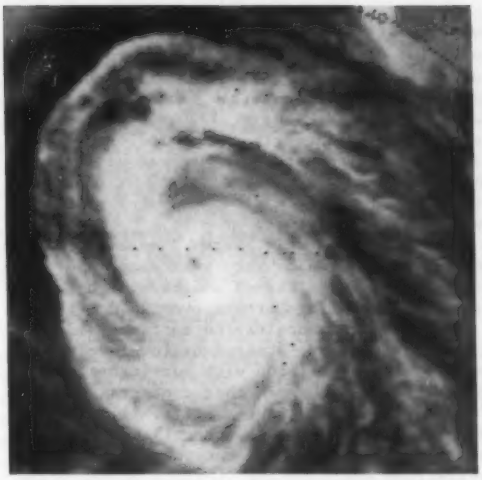


Figure 5.--Hurricane Cristina with 75 kn winds near 19.6°N, 116.5°W at 0245, 24 June

HURRICANE DOUGLAS, 25 JUNE-3 JULY

The fourth cyclone of the season began as an area of intense thunderstorm activity east of Clipperton Island on 23 June. Moving rapidly westward, the area was upgraded to a tropical depression 160 mi east of the Island at 0000, 25 June. The depression was upgraded to tropical storm Douglas 18 hr later as the center moved across the Island. The cyclone continued to move west for another 12 hr, then turned west-northwest and began to intensify rapidly over 29°C water. Winds reached their maximum intensity of 125 kn by 0000, 29 June near 13.8°N, 121.8°W, (fig. 6). Hurricane winds continued through 0600, 2 July, then began to diminish rapidly as the cyclone moved over colder 25°C water. By 0600, 3 July, winds were down to 30 kn near 17.8°N, 137.6°W. Eleven hours later the cyclone crossed 140°W longitude and into the CPHC's area of forecast responsibility.

Figure 6.--Hurricane Douglas well-defined eye and 125 kn winds at 0015, 29 June

HURRICANE ELIDA, 28 JUNE-8 JULY

A tropical disturbance formed over 28°C water 350 mi south of Salina Cruz, Mexico on 26 June. The distrubance was upgraded to a depression at 0000, 28 June when located 420 mi south-southwest of Acapulco. This tropical cyclone was named Elida at 1200, 29 June. A period of rapid intensification followed as the storm moved northwestward. Highest estimated winds of 115 kn were reached at 1200, 1 July. This was followed by a slow weakening as Elida moved west-northwestward at 8 kn.

Beginning on 4 July, forward movement slowed markedly in an area of very weak deep-layer mean winds. Elida first turned southwestward,, then southward, weakening further over 25°C water. On the 6th, Elida accelerated eastward as at tropical depression, steered by low-level westerly flow associated with hurricanes Fausto and Genevieve which were then centered near 24°N, 115°W and 13°N, 101°W, (fig. 7). Elida dissipated at 0000, 9 July near 15.8°N, 114.7°W. The ship SHINYU MARU sent many useful weather observations while in the vicinity of Hurricane Elida.

Figure 7.--Hurricane Elida dissipating between hurricanes Fausto to the north and Genevieveto the east at 2345, 8 July

HURRICANE FAUSTO, 3-10 JULY

A weak tropical disturbance moved into the Pacific from Guatemala on 1 July, headed west at 11 kn, then intensified rapidly into a tropical storm on 3 July after traversing a pocket of 30-32°C water near 11°N, 97°W. Fausto then turned northwestward, slowing to 6 kn in an area of weak southeasterly flow between two vigorous troughs in the westerlies which were located between 35° and 45°N latitude. Intensifying rapidly, Fausto reached its maximum intensity of 95 kn at 0000, 6 July 370 mi south of La Paz, Mexico, (fig. 7). Fausto continued to move northwestward, weakening slowly over progressively colder water. The cyclone turned west on 9 July, in response to an east-west ridge to the north of the storm which strengthened as the westerlies retreated northward. The final advisory on the cyclone was issued at 0000, 10 July with the center dissipating near 23.9°N, 117.8°W. The following ships sent valuable weather observations while in the vicinity of Hurricane Fausto: CONTINENTAL HIGHWAY, EXXON NORTH SLOPE, HONOLULU, LAFAYETTE, MALAHAT, S. MARIANA, STAR SINGAPORE, TOYOTA MARU No. 19, and TRAVIATA.

HURRICANE GENEVIEVE, 7-14 JULY

Genevieve began as a tropical disturbance 400 mi south of the Gulf of Tehuantepec on 6 July, moved northwestward and was upgraded to a depression at 0600, 7 July near 10.5°N, 095.5°W. Moving over 29-30°C water, the cyclone intensified rapidly, reaching hurricane strength by 1800, 8 July near 12.3°N, 100.4°W. Voice contact via excellent satellite communications with the tanker EXXON NORTH SLOPE, between the cyclone and the Mexican Coast during this period, was very helpful in evaluating and locating the center of Genevieve. Genevieve reached its maximum intensity of 100 kn at 1800, 10 July near 18.8°N, 107.8°W, (fig. 8). Continuing to move northwestward, the cyclone began to weaken over progressively colder water. By 0000, 14 July, winds had diminished to 30 kn over 25°C water 45 mi west of the tip of Baja California. The cyclone then turned north and 9 hr later moved onshore with 25 kn winds 80 mi northwest of Cabo San Lucas. Weather observations from the ships: BRATSTVO, B.T. SAN DIEGO, EVER VITAL, FREEZER QUEEN, LOUISE BRAVO, MOBIL ARCTIC, NARRAGANSETT, NEW JERSEY MARU, RIMBA MARANTI, S. MAGDALENA, TOYOTA MARU No. 15 and No. 19 were very helpful in locating the center of Genevieve as the cyclone moved up the west coast of Mexico toward Baja California.

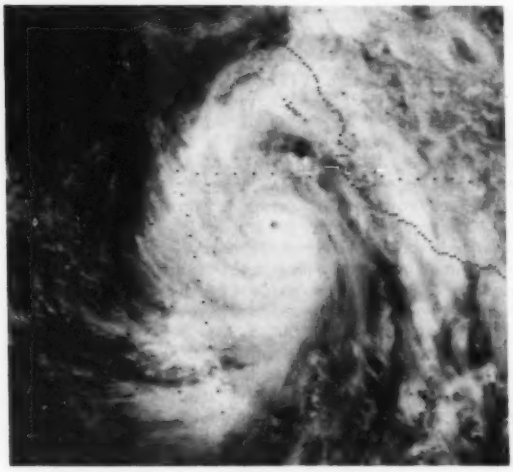


Figure 8.--Hurricane Genevieve off the west coast of Mexico at 1745, 10 July.

TROPICAL STORM HERNAN, 27 JULY-1 AUGUST

Hernan began as a tropical depression 400 mi south of the tip of Baja California at 1200 on 27 July. Moving west-northwest over 29°C water, the cyclone was upgraded to a tropical storm 12

hr later near 16.6°N, 112.3°W. Hernan then turned west along the south side of an upper-level HIGH centered at 28°N, 135°W. Winds increased to a maximum of 45 kn by 1200, 29 July, then began to slowly decrease as the storm moved over cooler 26°C water. A ridge, pushing south from the upper-level HIGH, began to turn Hernan slightly south of west as a sharp trough, which had moved to northern Baja California, sheared the cyclone's upper level outflow off to the northeast. Moving over 25°C water, Hernan weakened rapidly. The final advisory on the cyclone was issued at 0000, 1 August with the center dissipating near 17.1°N, 125.1°W.

HURRICANE ISELLE, 3-12 AUGUST

A disturbance passed into the Gulf of Tehuantepec from the Mexican mainland on the 2nd and 3rd of August, and was classified as the eleventh eastern Pacific tropical cyclone for 1984 at 1200, 3 August. It then moved west-northwestward over 30°C water on the south side of an upper-level HIGH centered over southern Mexico. The cyclone was upgraded to a tropical storm by 1800, 4 August and reached hurricane strength by 0600, 6 August. Maximum intensity of 115 kn was reached at 1800, 8 August near 18.3°N, 115.5°W or 50 mi west of Clarion Island. Iselle then turned northwestward, steered by a vigorous upper-level trough which was digging southeastward into the coastal waters of California. By the 11th at 0600, the winds had diminished to below hurricane strength. Rapid weakening followed as Iselle moved over 22-24°C water. Iselle dissipated at 1200, 12 August near 26.4°N, 124.2°W. The ships ARCHON, CLEMENTINA, EIBE OLDENDORFF, MINORU, and SUNBELT DIXIE supplied useful observations when in the vicinity of hurricane Iselle.

TROPICAL STORM JULIO, 15-20 AUGUST

Two days after the demise of Iselle, the next cyclone of the season began as a tropical depression 150 mi south of Acapulco. The cyclone moved westward over 29°C water for 12 hr, then turned west-northwest around the south end of a sharp upper-level ridge extending from the Gulf of Mexico southwestward across southern Mexico. Winds increased to tropical storm intensity by 1500, 15 August and 24 hr later were estimated at 50 kn near 16.3°N, 103.6°W. Moving past the ridge of high pressure, Julio exhibited a bursting pattern of high level outflow which was carried northeastward across central Mexico. Julio reached its maximum intensity of 55 kn during this period. Weather observations from the tankers EXXON JAMESTOWN, MOBIL ARCTIC, and FJORD LINER, and the ship GCPL were helpful in folloiwng the center of Julio under the high level outflow. Julio weakened rapidly after reaching maximum intensity. In spite of relatively warm 28°C water, vertical wind shear aloft resulted in rapid dissipation of the cyclone. The final advisory was issued at 1200, 20 August with the center dissipating midway between Socorro Island and Cabo Corrientes.

TROPICAL STORM KENNA, 16-18 AUGUST

A tropical disturbance, moving west from Panama on 7 August, travelled along the south side of a deep-layer mean ridge which extended from southern California through the Hawaiian Islands. Satellite imagery began to show increasing organization near the center of the disturbance by 15 August, and at 1530, 16 August the disturbance was upgraded to a tropical depression near 12°N, 134°W. Continuing to intensify over 27°C water, the depression was upgraded to tropical storm Kenna at 0000, 17 August. Moving west at 7-10 kn, with little change in intensity, Kenna passed into the CPHC's area of forecast responsibility between 0600 and 1200, 18 August.

HURRICANE LOWELL, 26-30 AUGUST

The fifteenth cyclone of the season was associated with an easterly wave that moved into the Gulf of Tehuantepec on 22 August. Moving rapidly west at 17 kn, the disturbance was upgraded to a depression in an area of weak vertical wind shear and 29°C sea-surface temperature at 0600, 26 August. Intensifying rapidly, the depression reached tropical storm strength by 1800, 26 August and hurricane strength by 1800, 27 August. Peak intensity was reached by 1200, 28 August with maximum sustained winds near 75 kn. This was followed by steady weakening as the storm moved northwestward over increasingly colder water. Dissipation occurred at 0600, 30 August near 24.4°N, 129.0°W. Weather reports from the ships with call signs GWVR and JCLG were helpful in finding the center of Lowell.

HURRICANE MARIE, 5-11 SEPTEMBER

Marie began as a tropical depression 140 south of Manzanillo, Mexico at 1200,5 September. Moving west-northwestward over 30°C water, the cyclone intensified rapidly and was upgraded to a storm 6 hr later and a hurricane by 0000, 7

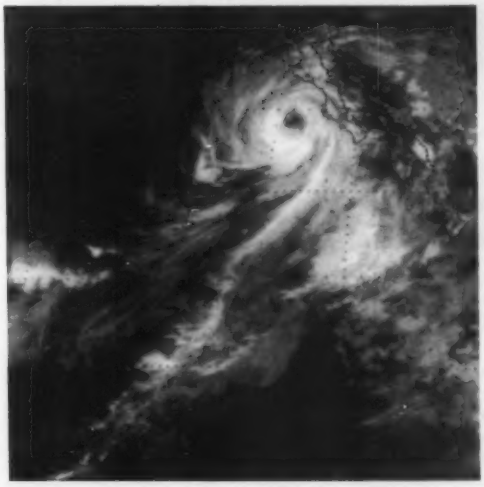


Figure 9.--Hurricane Marie near the tip of Baja California with 80 kn winds at 0500, 8 September.

September near 20.2°N, 110.6°W. The cyclone then turned northwestward, reaching its maximum intensity of 80 kn 24 hr later near 23°4N, 113.3°W, (fig. 9). Winds continued at 80 kn for 12 hr, then began to diminish as the cyclone moved up the west coast of Baja California toward colder 25°C water. U.S. Air Force reconnaissance aircraft flew into Marie at 1744, 8 September. They reported a porrly defined eye with a diameter of 20 mi, a sea-level pressure of 985 mb, and surface winds of 40 kn. A second pass through the cyclone one hour and forty-five minutes later showed the eye diameter had increased to 50 mi and surface winds at 30 kn. The following day another Air Force aircraft made t[illegible]rations of the cyclone. Surface winds were [illegible]imated near 35 kn and sea-level pressure at 995 mb. Continuing to move northwestward, Marie began to weaken rapidly. The final advisory was issued at 0000, 11 September as the center dissipated over 20°C water near 30.5°N, 120.6°W. Tracking Marie up the west coast of Mexico was helped by weather reports from the tankers EXXON JAMESTOWN and U.S.T. PACIFIC, from the cargo ships EASTERN MAID, OHTSU MARU, SEKI REX, and WESTERN HIGHWAY, the passenger liner FAIR SEA, and a ship with the call letters KSLY.

HURRICANE NORBERT, 14-26 SEPTEMBER

Norbert began as a tropical depression near 18.5°N, 115.5°W at 1800 on 14 September. Six hours later the cyclone was upgrade to tropical storm Norbert. Meandering in an anticyclonic path under very light deep-layer mean winds, the storm intensified slowly. After 0600, 16 September rapid intensification took place. Within 2 hr winds reached hurricane strength and by 0000, 21 September were at maximum intensity of 115 kn near 17.3-N, 116.1-W, (fig. 10).

Figure 10.-- Hurricane Norbert at 0300, 22 Septem ber near 16.5°N, 111.3°W at 110 kn. Hurricane Odile was 85 kn at 16.4°N, 101°W.

Between 19 and 22 September, a deep-layer mean ridge, centered over the Rocky Mountains, was replaced by an upper-level trough which extended southwest to the west of Cabo San Lucas. This trough steered Norbert northeastward, beginning on 23 September.

Reconnaissance aircraft were flown into Norbert on the 23rd, 24th, and 25th of September. A closed eyewall was observed on all 3 days with the eyewall diameter increasing from 8 mi on the first day to 15 mi on the last day. Norbert moved onshore with 55-kn winds at Pt. Abreojos on the Baja California coast on 26 September. The storm moved across Baja and the Gulf of California, hitting the Mexican mainland near Tiburon Island. Weather observations from the ships ATLANTIC MARU, EVER VITAL, HOYO MARU No. 58, INCOTRANS SPIRIT, LAKENESS, NEDLLOYD WISSEKERK, and TOYOTA MARU No. 19 were helpful in tracking Norbert.

HURRICANE ODILE, 17-22 SEPTEMBER

Hurricane Odile began as a disturbance 160 mi south of Acapulco in the late afternoon of 16 September. Moving west over 28°C water, the disturbance was upgraded to a depression at 1800, 17 September near 14.3°N, 101.5°W. The cyclone then began to curve west-northwestward and northward beneath an upper-level HIGH centered over Acapulco. By 0000, 20 September, the cyclone had reached hurricane intensity near 16.5°N, 104.5°W. The cyclone then turned eastward between the upper-level HIGH, which was now southwest of Acapulco, and an upper LOW over northern Mexico. By 0600, 22 September, Odile reached its maximum intensity of 90 kn 60 mi west-southwest of Acapulco. Odile now turned northwestward and accelerated rapidly toward the Mexican coast in response to a sharp upper-level trough digging southward over Baja California. Odile moved onshore 40 mi northwest of Zihuantanejo with 50 kn winds at 1800, 22 September. Weather reports from the passenger liner SANTA MAGDALENA, and cargo ships LANIA, ZHANG JIA KOU, and CANADA EXPRESS were very helpful in evaluating and locating the center of Odile while the cyclone was off the southern Mexican coast.

HURRICANE POLO, 26 SEPTEMBER-3 OCTOBER A

A tropical disturbance that moved west-southwestward into the Gulf of Tehuantepec on 24

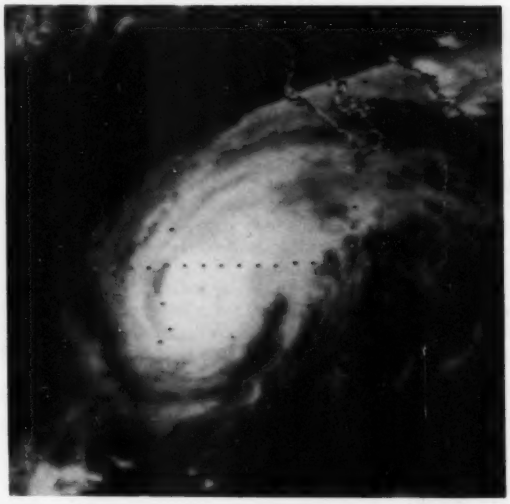


Figure 11.--Hurricane Polo near 19.4°N, 114.1°W with 100 kn winds at 1200, 1 October.

September became the 21st cyclone of the season at 0000, 26 September near 12.9°N, 097.6°W. The cyclone moved rather uneventfully west-southwestward for several days, then on 29 September it turned northwestward and began to intensify, reaching its maximum intensity of 100 kn by 1200, 1 October near 19.4°N, 114.1°W, (fig. 11). The cyclone then turned north and northeastward in response to an upper-level trough moving across Baja California. Vertical wind shear and cooler sea-surface temperatures produced a rapid decrease in wind speed after Polo crossed 20°N latitude. Reconnaissance aircraft near the storm center at 1800 on 2 October reported 65 kn surface winds. A second penetration of the cyclone 3 hr later estimated surface winds at 50 kn.

Polo crossed the tip of Baja California between 0600 and 1200 on 3 October with 30 kn winds near its center. The cyclone moved onshore 150 mi northwest of Mazatlan at 1800, 3 October. Weather reports from the ships ASIAN HIGHWAY, EASTERN MOON, FREEZER PRINCE, GLOBAL HIGHWAY, SCANDINAVIAN HIGHWAY, SEALOCK, GCJG, and WZBF were helpful in tracking Polo off the west coast of Mexico.

TROPICAL STORM RACHEL, 7-16 OCTOBER

The 22nd cyclone of the 1984 season began as a disturbance, moving across Costa Rica on 4 October. Maintaining its identify, but showing little intensification, the disturbance moved west over 27°C water for 3 days before becoming a depression near 11.2°N, 097.0°W at 1800, 7 October. Moving over slightly warmer 28°C water, the cyclone began to intensify and was upgraded to tropical storm Rachel at 0600, 9 October near 11.8°N, 103.0°W. Weather reports from the ship WOENSDRECHT helped to locate the center of Rachel during this period. The cyclone then turned west-northwestward in response to a broad upper-level trough off the Baja California coast. Winds increased to a maximum intensity of 55 kn by 0600, 10 October, continued through 0600, 11 October, then began to decrease as the cyclone moved over 27°C water. Within 24 hr the winds were down to 25 kn where they remained through the final advisory issued at 1200, 16 October with the center dissipating near 15.2°N, 119.9°W.

TROPICAL STORM SIMON, 31 OCTOBER-8 NOVEMBER

Tropical Depression 23 developed in the Gulf of Tehuantepec on 30 October and moved west at 10 kn. Steering was provided by a deep-layer mean HIGH, initially centered over the Gulf of Mexico, which retrograded to 120°W longitude by 6 November. The cyclone followed a typical curve of intensification, reaching tropical storm intensity on 1 November and a maximum intensity of 55 kn late on 2 November over 29°C water. Slow weakening followed as the storm moved over progressively colder water. The final advisory on the cylone was issued at 0000,8 November with the center dissipating near 15.7° N, 133.2°W. Weather reports from the ships FREEZER PRINCE, MARITIME NOBLE, SUNBELT DIXIE, and UJNV were helpful in tracking Simon.

REFERENCES

Dvorak, Vernon F., 1973: A technique for the analysis and forecasting of tropical cyclone intensities from satellite pictures. NOAA Tech. Memo. NESS 45, 19 pp.

Mariners Weather Log

CLIMATOLOGICAL CHARTS OF THE ST. LAWRENCE

GERALD VIGEANT
ENVIRONMENT CANADA
CLIMATOLOGICAL SERVICES
SAINT-LAURENT, QUEBEC, CANADA

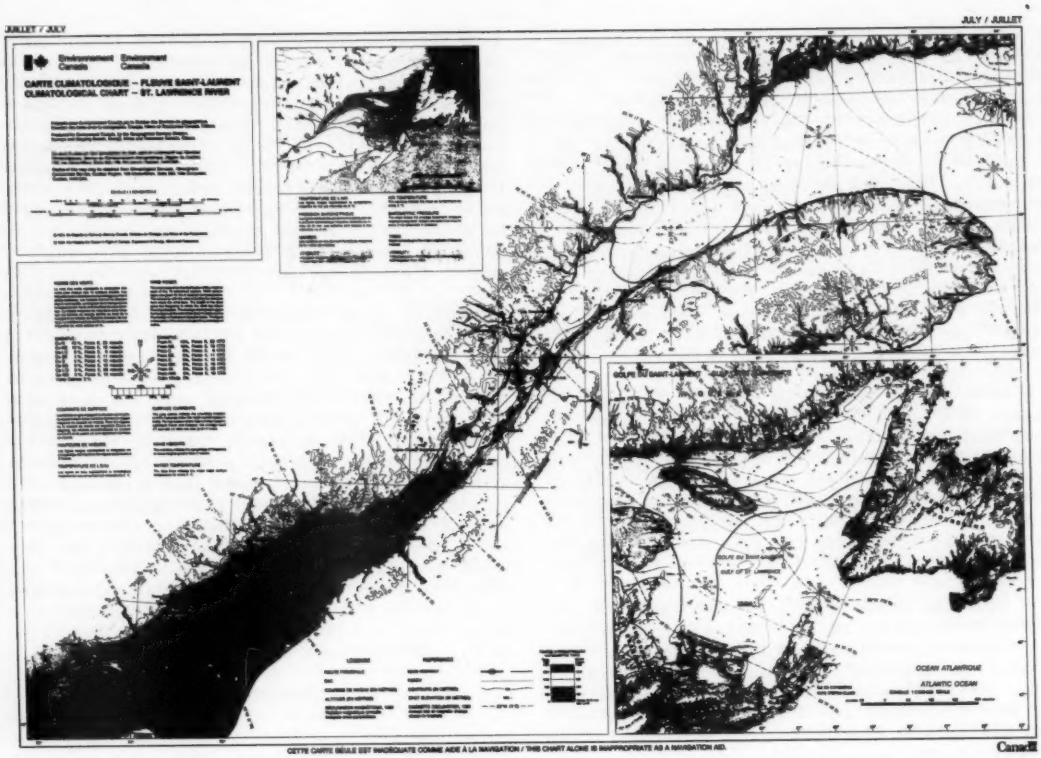
I INTRODUCTION

Requests for climatological information in the Gulf of St. Lawrence and its estuary are growing constantly in such fields as marine transportation and security, oil and gas exploration and exploitation, environmental emergencies, leisure, fisheries, etc. The "Climatological Charts of the St. Lawrence" are published by Environment Canada in order to comply with such requests: they offer an overall climatology for the St. Lawrence in a suitable and concise format. This overall climatology not only includes weather parameters such as wind, air temperature, barometric pressure and visibilities, but also oceanographic elements essential to users such as waves, water surface temperature, surface current and tide (figs. 12 and 13).

The present explanatory guide should enable users:

a) to read and understand plotted and analysed information on the charts;
b) to estimate the quality of basic data and analyses, being award of their sources and limitations; and
c) to discern rapidly major characteristics of each weather and oceanographic parameter.

The package includes ten climatological charts. Each chart corresponds to a specific month with the exception of January, February and March whose statistics have been combined. On each chart, users should find riparian topography, major land roads, major waterways, most used geographical benchmarks, ferries and magnetic declination. These informations have been given by the Survey and Mapping Branch, Energy, Mines and Resources Canada.


JUILLET / JULY
JULY / JUILLET
Environnement Canada
Environment Canada
CARTE CLIMATOLOGIQUE – FLEUVE SAINT-LAURENT
CLIMATOLOGICAL CHART – ST. LAWRENCE RIVER
OCEAN ATLANTIQUE
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Canada

Figure 12.--Climatological chart of the St. Lawrence River produced by Environment Canada.

The guide mentions, among other elements, that the St. Lawrence has the following characteristics:

- Prevailing winds across the Gulf shift from northwesterly in winter to southerly in summer.
- Winds tend to blow along the axis of the marine channel in areas where the riparian topography is more pronounced.
- Waves are higher in winter, especially across the Gulf.
- At the mouth of the Saguenay River, a cold water area persists all summer long due to the upwelling of deep waters to the surface. The mean air temperature of these regions is affected by this phenomenon.
- The cold Labrador current has a major influence on the water temperature regime along the lower north shore between Anticosti Island and the Strait of Belle Isle.
- Visibilities are poor more frequently n summer, particularly in the Strait of Belle Isle.
- Semi-diurnal tides reach more than 5 metres in the neighborhood of Ile d'Orleans but less than 1 metre across the Gulf.
- The upper Estuary, from Quebec city of Ille aux Coudres, has the strongest surface currents with flood and ebb speeds exceeding 4 and 6 knots respectively, particularly near the Quebec city bridge, Ile aux Coudres and the Saguenay River.

II DATA BASE AND METHODLOGY

Weather observations aboard ships in transit across the St. Lawrence and from gas and oil drilling rigs are very extensive. However, such a raw data base has several limitations, such as:

a) The number of observations varies strongly from one area to another, with 3,000 data from the Quebec city to Ille aux Coudres area and 21,000 data for the Pointe-des-Monts to Anticosti Island area.

b) Observations are not uniformly distributed over the St. Lawrence, being strongly concentrated along major waterways.

c) Observations are made at vsrious heights above water. An analysis of the anemometers aboard Canadian ships in 1982 reveals that the height varied from 7 to 80 metres with an average of about 22 metres.

d) Observations are not seasonally uniform: 70% of them were made from April through October.

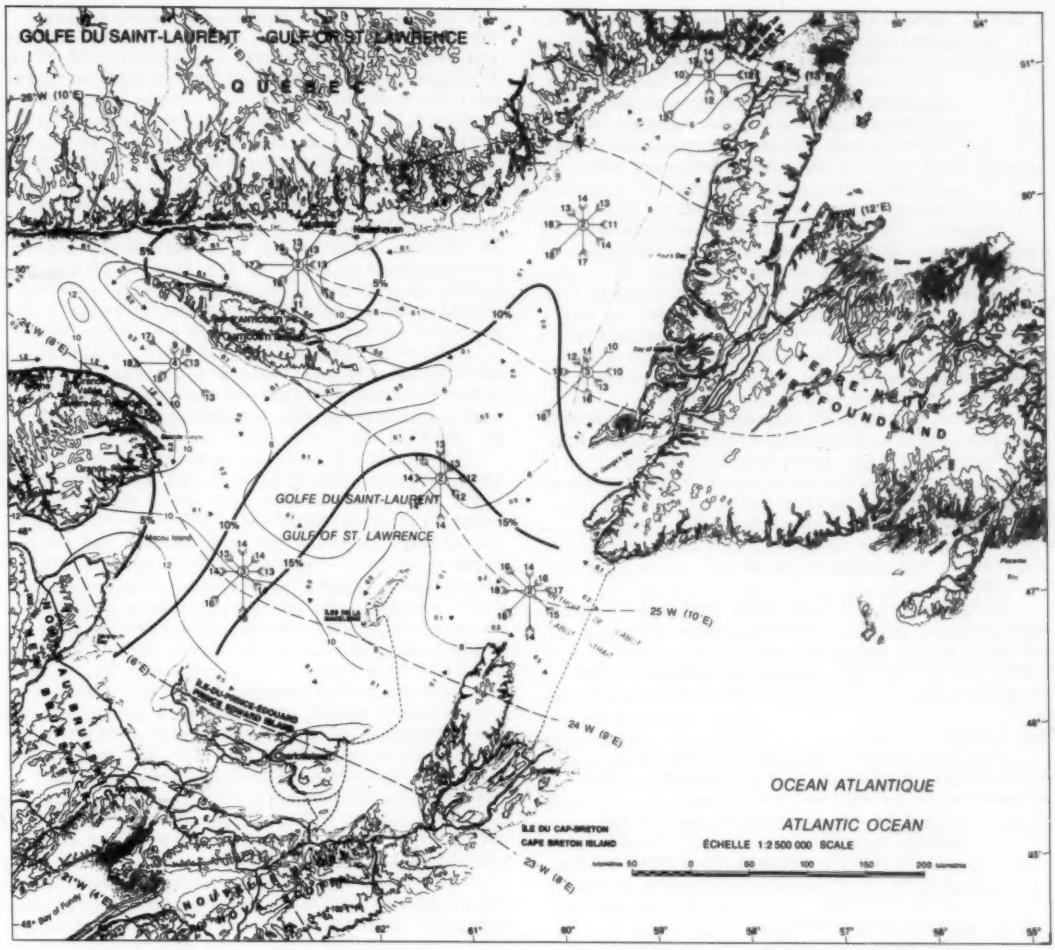


Figure 13.--Gulf of St. Lawrence inset on the chart.

e) Observations are not uniformly distributed between day and night: 65% hours.

f) Data are biased towards fair conditions (lighter winds, smaller waves, improved visibilities, etc.) and extreme conditions are rarely reported, as ships try to avoid poor weather conditions.

g) The quality of data is variable: it depends upon the experience of the officer in charge of weather observations.

The climate of the St. Lawrence can also be described from the hourly weather data base from Atmospheric Environment Service land stations. This data base has the advantage of being homogeneous and efficiently archived. However, it gives climatological information on land environment but not on weather conditions prevailing on the water.

Taking into account the respective weaknesses of the marine and land data bases, another approach favors the development of a statistical model. Weather parameters observed over water are compared with those observed simultaneously at a land station, and a satisfactory statistical relation between the data is derived. Such a relation enables the computation, from each hourly observations made at the land station, of an hourly weather observation representative of the concerned marine area.

These derived climatological data are more complete and homogeneous, with the weakensses of raw marine data being mostly eliminated. However, this statistical technique has two disadvantages:

a) The statistical relation used to develop the derived climatology is more reliable when marine weather observations are numerous. It should be noted that the number of wind observations is limited from Quebec

city to the Saguenay and in Chaleur Bay.

b) The quality of the statistical relation depends upon the land station used as reference. The surrounding topography, the distance between the station and the marine area, the type of program and the duration of the observations can affect the reliability of the relation.

Chapter III deals with parameters (winds, wave heights, air temperature and barometric pressure) derived with the statistical technique. Chapter IV describes the weather parameters extracted directly from raw observations (water surface temperature and visibilities). Finally, chapter V deals with oceanographic parameters taken from existing publications (tides, surface currents).

III DERIVED WEATHER AND OCEANOGRAPHIC PARAMETERS (WINDS, WAVES, AIR TEMPERATURE, PRESSURE)

The statistical technique is used to develop hourly weather data bases for 15 sectors across the Estuary and the Gulf. Figure 13 shows these15 sectors along with the land stations used to derive the wind, wave, air temperature and pressure data.

A. WINDS

Winds govern directly many physical components of the St. Lawrence, such as ice movement, waves and currents. Winds are themselves influenced by coastal proximity and topography and by the extent and depth of the water.

Data Display

The wind regime for a given area is concisely illustrated with a wind rose. The following wind parameters are given:

- The frequency in percentage of the winds according to each of the eight points of the compass is stated by the length of the wind shaft. The scale of percentages is given on each chart under "wind roses".
- The mean wind speed for any direction is given in two ways: the figure at the end of the shaft indicates the monthly average speed of the wind in knots while the number of feathers connected to the shaft corresponds to the speed category according to the Beaufort scale.
- The frequency in percentage of calm winds is given at the centre of the wind rose.

Description of the Wind Regime

In general, winds prevailing across the Gulf blow from the northwest in winter and become southerly in summer. This applies particularly for the Iles de la Madeleine and Cabot Strait areas. The closer one gets to the Estuary of areas of the Gulf with pronounced riparian topography, the more winds tend to blow according to the axis of the marine channel. Such a phenomenon is especially encountered in the Estuary and in canalized areas near Anticosti Island, in the Strait of Belle Isle and Chaleur Bay.

Let us take for example the area in the upper Estuary extending from Quebec city to Ile aux Coudres. It is directly bounded to the north by the Laurentian Mountains whose summit reaches over 1,000 metres. This physical frontier tends to give mostly southwesterly and northeasterly winds all year long. As we move eastward, this phenomenon becomes less significant, due mostly to the relative flattening of topography and the considerable widening of the Estuary and Gulf.

In general, the monthly average wind speed increases from west to east. It is also greater in winter. For the Ile d'Orleans area, the monthly average speed varies from 12 knots in summer to a high of 16 knots in winter while in the Iles de la Madeleine region, it reaches 17 knots in summer and over 21 knots in winter.

In addition to the limitations stated in chapter II, the statistical technique underestimates the frequency of calm winds, particularly from May through October.

B. WAVES

The major elements governing the height and speed of waves are the speed and direction of winds, their steadiness in a given direction or speed, the fetch (distance to the coast in the direction from which the wind blows) and the depth of water. In oceanography, we use the "significant height" statistical concept which gives a rather good estimate of wave height observed on ships. The maximum wave height corresponds roughly to 1.8 times the significant height.

The restricted number of direct measures and observations of waves makes it mandatory to use a theoretical model of wave generations based upon hourly wind direction and speed, the fetch and the depth of water. Because of its realism, the Baird model (1978) developed under the direction of Public Works Canada has been used in the present study to compute the period and height of waves.

The model requires a mean water depth and the length of the fetch in any given direction, retrieved from marine charts. It also takes into consideration wave decay when winds change direction or speed, but does not include the resonance effect encountered when the wind and the surface current are intense and of opposite direction.

The Baird model is reliable but needs the hourly wind data derived statistically. Limitations stated in chapter II and III A thus apply to wave data.

Data Display

On each climatological chart (except for winter time), the frequency in percentage of the significant wave heights over 2 metres is shown by large red lines at every 5% intervals.

Description of the Wave Regime

Upstream of Pointe-des-Monts, the St. Lawrence Estuary rarely experiences waves over 2 metres, mostly because of the limited fetch along the axis of the marine channel and the shallow water.

The highest waves are experienced mostly in the neighborhood of Iles de la Madeleine and Cabot Strait in a persistent and strong southeasterly wind and along the western coast of Newfoundland and in the Strait of Belle Isle in an intense southwesterly wind.

December has the greatest frequency of waves over 2 metres, with values ranging from over 5% at the Saguenay level to 20% in the Detroit d'Honguedo and over 40% at the entrance of Cabot Strait.

C. AIR TEMPERATURE

Air flowing over an important water body such as the St. Lawrence sees its temperature become gradually closer to the water's. Data Display

Using the monthly mean air temperatures derived statistically for the fifteen marine areas and those observed at the land stations, it has been possible to draw in red on the climatological charts the equal air temperature lines at every 2°C intervals.

Description of the Thermal Regime

During winter, a widespread ice cover across the Estuary and the Gulf reduces considerable the influrence of the water body on neighbouring air. The thermal regime thus becomes relatively uniform, the mean ranging from -9°C in the Estuary and Anticosti Island to -5°C in the Cabot Strait.

Starting in April, the characteristic water temperatures at the mouth of the Saguenay and in the Strait of Belle Isle begin to affect the monthly mean air temperature. Indeed, from April to September, the air is permanently cooler between Ile aux Coudres and Pointe-des-Monts and in the Strait of Belle Isleaxis. The monthly mean temperature is 2 lower than the one observed on land. However, in fall, the mean air temperature on the water is from 1 to 2 °C higher than the one measured on the shore.

D. PRESSURE

The average monthly mean sea level barometric pressure brings out certain flow characteristics in a given area. However, such a mean barometric pattern should not take the place of the wind rose in any given marine area; indeed, winds are related to the different low pressure systems moving regularly across the region.

Data Display

Using the monthly barometric pressure data derived statistically for the fifteen marine areas and those observed at the land stations, lines of equal barometric pressure are drawn in blue on the climatological chart and given in millibars (mb). One must remember that 1 mb equals 0.1 kPa.

Description of the Barometric Regime

During winter, the mean barometric regime in eastern Canada and northern Atlantic remains strongly influenced by a low pressure center located midway between Iceland and Greenland and by a permanent high pressure system located near the Bermuda Islands. As summer approaches, the low pressure center moves gradually westward to reach the Davis Strait in July. Meanwhile, the high pressure center leaves the Bermuda area to drift slowly northward.

A weak trough of low pressure is reported along the marine channel of the Estuary in fall and winter. This is caused by the difference between air temperature and water temperature. Indeed, during the fall and winter months, the water is usually warmer than the air on the coast thus favouring a local barometric pressure fall. Snowsqualls are frequently caused by the development of such a trough commonly called "thermal trough".

IV OBSERVED WEATHER PARAMETERS (WATER TEMPERATURE AND VISIBILITY)

A. WATER SURFACE TEMPERATURE

The physical properties of the water govern strongly the climate of the St. Lawrence. Knowledge of the distribution of the water surface temperature might help the user in planning a cruise aboard a sailboat (in the choice of clothing, for example) or in anticipating the development of fog in specific areas of the St. Lawrence.

Data Display

On every climatological chart, lines of equal water surface temperature are indicated in blue at every 2 °C intervals, using approximately 72,000 water temperature observations taken from ships in transit across the River and the Gulf. The quality of the data remains quite variable: some observations are read directly from the engine room water intake while othrs, more reliable, are taken from the sea temperature bucket thrown in the water.

Description of the Thermal Regime

The impact of the Saguenay River on the thermal regime of the Estuary is striking; at the Saguenay level and on the south shore below Rivere-du-Loup, mean water temperatures below 10 °C in summer are predominant due to the upwelling of cold and deep waters at the mouth of the Saguenay River. This cooling propagates down the River to Rimouski and as far upstream as Ile aux Coudres. Such an upwelling is also noticeable off the east point of Anticosti Island.

The cold Labrador current hugging the lower north shore up to the Detroit de Jacques-Cartieris mainly responsible for mean water tempertures seldom exceeding 10° C in summer over these regions.

In the area located to the south and to the west of Iles de la Madeleine, the depth of water is relatively shallow (below 100 metres) thus resulting in a rapid and noticeable warming during the summer.

B. VISIBILITY

Visibility across the St. Lawrence is reduced mostly by fog and precipitation.

Data Display

Using the visibilities observed in the 15 marine sectors and those registered at the land stations, the frequency of visibilities reduced at less than 1 km is given on every climatological chart. For instance, a yellow line of 6% means that a visibility of less than 1 km occurs during 6% of the time in the area.

Description of Visibilities

Visibilities of less than 1 km are most frequently reported in the Strait of Belle Isle, at the entrance of Cabot Strait and in the vicinity of Iles de la Madeleine, mainly between June and August. Indeed, in summer, cooling of warm air over relatively cold waters across thegulf enhances the development of fog. This is particularly noticeable in the Strait of Belle Isle where monthly frequencies of low visibilities in July are over 20% compared to

less than 5% in the Estuary.

Excellent visibilities are likely to occur in September and October. This can be explained by the warming of the cold air by warmer waters which causes air turbulence that reduced fog occurrence. In those months, the monthly frequency of visibilities reduced at less than 1 km ranges from 2% near Quebec city to 6% east of Anticosti Island.

V OCEANOGRAPHIC PARAMETERS (TIDES AND SURFACE CURRENTS)

A. TIDES

Tidal information have been taken from the Sailing Directions and the Tide Table published by the Canadian Hydrographic Service.

Data Display

The semi-diurnal tide is defined as a tide featuring two full cycles of low and high waters per day. On every climatological chart, the amplitude of the mean semi-diurnal tide is given in metres and is indicated by circled black numerals at several locations along the shores of the St. Lawrence. The values shown correspond to the annual mean; therefore, they are identical on every chart.

Description of Tides

Generally, the tide amplitude across the Gulf does not exceed 1 metre and becomes insignificant in the vicinity of Iles de la Madeleine. Going upstream in the Estuary, the mean semi-diurnal tide amplitude increases rapidly from 1 metre in the Detroit de'Honguedo to 3 metres at the mouth of the Saguenay River. The amplitude finally reaches more than 5 metres east of Ile d'Orleans. This increase in the tide amplitude is mainly attributable to the narrowing of the Estuary and the relatively important rise of the river bed upstream of Pointe-des-Monts.

Other types of tides (diurnal, mixed, etc...) observed across the Estuary and the Gulf compete with the semi-diurnal tide but they are less important. Consequently, one should not be surprised to encounter tide amplitudes slightly greater than the ones indicated on the climatological charts.

B. SURFACE CURRENTS

Surface currents consist mainly of three components: tidal streams, wind-driven currents and currents produced by horizontal changes in water density. In the St. Lawrence River, the tidal component clearly predominates while currents observed across the Gulf are generally weaker and mainly induced by the water density variations.

Data Display

In order to describe adequately the behavior of surface currents, two different data displays have been used on the climatological charts:

1) From Montreal to Ile du Bic, data are taken from the Sailing Directions and the Tidal Current Charts, St. Lawrence Estuary, Orleans I. To Father Point published by the Canadian Hydrographic Service. A double arrow (<---->) describes the direction and the intensity of the current induced by the mean tide at several relevant locations along the River. The mean current speed (in knots) taking place during a rising tide is indicated by numerals preceded by an "F" for "flood". Similarly, a "J" followed by numerals shows the mean current rate observed during a falling tide (ebb). Usually, the ebb stream is stronger than the flood rate.

2) Results obtained from El-Sabh (1977) using a circulation model based on the variation of the water density have been used to describe currents downstream of Ile du Bic. An arrow gives the prevailing current direction in the area while numerals above the arrow represent the mean current rate in knots. Generally, current directions derived from El-Sabh's model are reliable but speeds are often underestimated.

Description of Surface Currents

In the sector going from Montreal to Lac Saint-Pierre, a permanent river current sets to the north-east at a rate of 1 to 2 knots. From Lac Saint-Pierre downward, the tidal current becomes more and more important. Between Trois-Riveres and Quebec city, the ebb rates vary from 2 to 3 knots while the flood stream reaches about 2 knots. The channel near the Quebec city bridges, called Le Sault, is characterized by the strength of the tidal stream. The ebb tidal stream reaches 5.5 knots while the flood speed is about 4.8 knots. Serious problems of navigation may be anticipated in the channel.

Between Quebec city and Ile du Bic, the current usually sets along the River with a flood stream of 1.5 to 2.5 knots and an ebb speed ranging from 3 to 4 knots. However, along the north shore of the Estuary between Petite-Rivere-Saint-Francois and Cap-a-l'Aigle, flood and ebb rates of 4 and 6 knots respectively have been observed: such currents couples with opposite winds may force many mariners to turn back.

Similarly, on the south shore between Riviere-Quelle and Saint-Jean-Port-Joli, the "Traverse St-Roch" is the area of the St. Lawrence where the strongest currents are observed. The ebb stream reaches 7 to 8 knots and the flood stream 6 to 7 knots. The narrowing of the Estuary at the Ile aux Goudres level and the ridging in the river bed are responsible for the presence of such intense currents.

Mariners must be careful while entering the Saguenay River because of ebb and flood rates of 6 and 3.5 knots respectively. Navigation can become hazardous especially with intense easterly or westerly winds channelled in the Saguenay valley.

Tides have a minor influence on the strength of the currents observed in regions downstream of Ile du Bic and in the Gulf. In fact, the difference between the ebb and flood rates rarely exceeds 0.5 knots. Therefore, it becomes more appropriate to talk about a residual current rather than ebb or flood tidal streams.

A circular motion characterizes the movement of waters in the Gulf and in the lower

Estuary (from Points-des-Monts to Anticosti Island). The current enters into the Gulf by the Strait of Belle Isle, hugs the north shore westward, turns southward at Port-Cartier and Pointe-des-Monts and finally is incorporated to the Gaspe current setting to the southeast. The Gaspe current is itself divided in two secondary streams: one crosses the middle of the Gulf, combines with the incoming current of the Cabot Strait, moves northward along the west coast of Newfoundland and finally ends up partly into the ocean through the Strait of Belle Isle.

The other secondary stream veers southward, trickles into the passage between Iles de la Madeleine and Prince Edward Island and flows out into the Atlantic Ocean through the Cabot Strait. The average speed of the residual current remains under 1 knot and depends upon the seasons and the ice coverage.

Since most current measurements have been taken during the summer, it is possible to observe significant local differences in the direction and speed of currents caused, for instance, by the high water flows from tributary rivers occurring in spring.

****

The "climatological charts" of the St. Lawrence are produced to provide a concise and efficient method of displaying the climatological and oceanographic information required by various users. If you wish to express comments, suggestions or recommendations relating to any parts of the package offered to you, please let us know in writing to the following address:

The climatological charts of the St. Lawrence and the user guide are available by mail for $7.00 (Canadian) at the following address:

Environment Canada
Climatological Services
100 Alexis Nihon Blvd.
3rd Floor
St-Laurent (Quebec)
H4M 2N8

Marine Observations Program

J.W. Nickerson
National Weather Service,
NOAA
Silver Spring, Maryland 20910

FEEDBACK

Feedback is the response received by letters, comments on the 72-1A and 72-4A forms, and the occasional survey on weather forecasts, on facsimile maps, or even on articles in the Mariners Weather Log. We who are working to put out these products often wonder about the impact of our work on you the mariner. Our best source of this information is from the feedback about our products. Let's look at the various feedbacks that we need to keep our products responsive to your needs.

FEEDBACK ON WEATHER FORECASTS

We have provided a "Weather Forecast Evaluation" section on the back of the NOAA Form 72-1A, "Ship's Weather Observations." Looking at the feedback comments that I have received, which are comparitively few, there are two things which are obvious: (1) 90 percent are complaints and (2) they are usually written while the author is very angry. We, of course, want to know when the forecast is wrong, but saying it is "no damned good" doesn't help us correct problems. We get the message even plainer if you compare specific observations to the forecast. Having the observation facts allows the forecaster to go back to the forecast map and review the conditions so he can improve future forecasts.

The comments on good forecasts are just as important as complaints and much easier to receive. If you make the effort to make a weather observation and report it -- complete the loop -- tell the forecaster how you are using it. It will help improve the forecasts you will receive in the future.

FEEDBACK ON HURRICANE ADVISORIES

Every hurricane season, we read about some ship that runs afoul of a hurricane. Sometimes it's on the back of a 72-1A as a complaint that the hurricane didn't behave as forecast. The nature of a hurricane puts the hurricane advisory in a different class then other forecasts.

A hurricane originates in the Tropics where the wind at the upper levels is light so the hurricane winds are the dominating force in the area. As the hurricane is continually changing internally, these changes affects its course and speed. The erratic nature of tropical storms, cyclones, hurricanes, and typhoons should be obvious from any "Hurricane Alley" feature of the Mariners Weather Log. Unless you are lucky at teasing snakes and russian roulette, don't get close to a hurricane. Remember, that high waves may extend ahead of the storm robbing you of your maneuverability to avoid it.

Feedback, and storm narratives, are very valuable because the hurricane experience is relatively rare, compared to other storms. Please share your experiences through feedback.

FEEDBACK ON COMMUNICATIONS

Rapid communications are necessary to get the observations to the forecaster as well as get the forecast back to the ships. The first computer run at the National Meteorological Center is only a little after one hour following the synoptic hour, so we all have to work diligently to discover and correct any delays. "Tips to the Radio Officer" responds to your comments as well as introducing material. Your feedback is very helpful in this endeavor.

FEEDBACK ON THE MARINERS WEATHER LOG

The Mariners Weather Log (MWL) is continually being changed; hopefully, improved. There are more information papers now. In fact, I did a paper on freak waves instead of the usual marine observations feature in the Winter 1985 edition of the MWL. Sections of the actual weather maps are now being used rather than so many satellite images. You may even see your own ship's observation, if you were in a particular storm. The ship's call sign is below and to the left of the ship's position circle. Notice the small numbers that run north and south and are circled with dots. These are other ships that were too close to a plotted report to be plotted separately without overlapping. This crowding is not unusual in the shipping lanes, but rare outside.

Your feedback on tne MWL is always important so that we can tell if this is the product you want and need for your operations.

FEEDBACK ON OBSERVATIONS

In the last several months I have responded to letters asking for feedback information from the PMOs about observations. As some of you point out, the chances of any individual observer seeing a PMO during the ship's inport stay are slight indeed. We will review a proposed form and should get you your requested feedback possibly by the next issue of the MWL.

PRIDE OF BALTIMORE AND GODSPEED

If you see a sailing ship from the past come over the horizon, it isn't the Flying Dutchman's little brother, but either the Pride of Baltimore, figure 14 or the Godspeed, figure 15. Both are Voluntary Observing Ships (VOS) during their cruises, but will be reporting by single sideband radio. They will give the standard synoptic ship report, except it will be by voice.

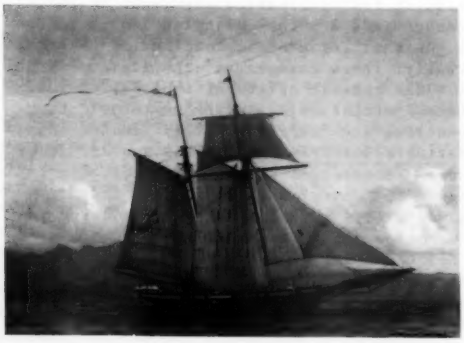


Figure 14.--The Pride will be visiting European ports this summer from Oslo, Norway to Malaga, Spain where it will go into winter lay-up in November.

AROUND THE WORLD WITHOUT NAVIGATION INSTRUMENTS

Captain Marvin Creamer, the yacht GLOBE STAR, sailed around the world without benefit of any navigational instruments -- compass, sextant, timepiece, or electronic location

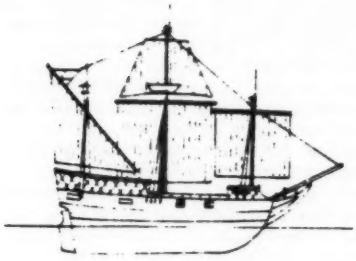


Figure 15.--The Godspeed will depart London April 30 for the Canary Islands. Crossing the Atlantic in the tradewinds, they plan on arriving at Martinique on June 12 and Cape Henry, Virg. on July 4, 1985.

device. He departed National Park, NJ on December 15, 1982 and returned on May 1984, 17 mo and 31,000 mi later. During his entire voyage he took weather observations.

MEXICO MARINE OBSERVATIONS PROGRAM

At the invitation of the Mexican government, Jerry Nickerson, Marine Observations Program Leader, visited Mexico City, March 4-17, 1985. The purpose of the visit was to assist in the development of marine and port meteorological officer programs, and provide a short course in marine meteorology for Mexican waters.

Contralmirante (rear admiral, navy) C.G. DEMN Manuel Monroy - Gutierrez organized the support for the training course in conjunction with Petroleos Mexicanos (PEMEX) and the Mexican Meteorological Service under Director General Silvino Aguilar Auguano. Admiral Monroy was also the keynote speaker at the inauguration and closing ceremonies. Teniente (lieutenant) de Navio C.G. Francisco Ponce Fernandez de Castro aided me in the course presentation and some of the technical interpretation.

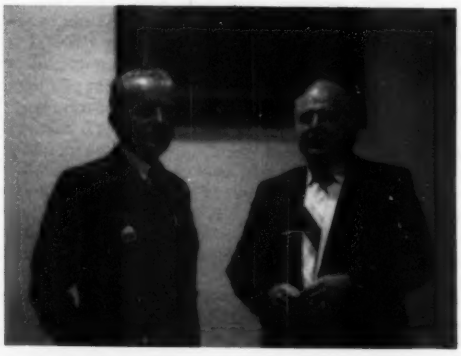


Figure 16.--Admiral Monroy and Mr. Nickerson discuss the subjects of the marine meteorology course.

In addition to training prospective PMO's and program administrators in some aspects of marine meteorology and oceanography, there were several conferences on marine services in the Mexican waters. The communications for marine interests in Mexican waters are given under "Tips to the Radio Officer." An increase in coastal and ship observations in Mexican waters will undoubtedly improve forecasting, both United States and Mexican. They have already translated the handbook and observing forms into Spanish to encourage Mexican ships to make more observations. We seem to be off to a good start, but there is much yet to be done.

PORT METEOROLOGICAL OFFICER CONFERENCE

There are preliminary plans for a Port Meteorological Officer (PMO) conference to be held at NWS Headquarters in Silver Spring, MD. The tentative dates are from October 21-25. Mexican and Canadian PMO's will, of course, be invited to attend. Now is the time to get with your PMO's to make your views on the program known, or if you're in town during the conference, please let me know if you can attend.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL WEATHER SERVICE
Silver Spring, Md. 20910

Dear Master, Mates, and Radio Officers:

The hurricane season, June 1 to November 30, is when the National Weather Service and the National Hurricane Center start special programs because of the hurricanes. It will also require increased vigilance on your part.

When a tropical system is discovered, its position and best estimate of future travel will be broadcast as an advisory. However, if you will look at any "Hurricane Alley" feature in the Mariners Weather Log you will see that hurricanes change course and speed frequently and that long-term movements are virtually unpredictable. It is best to plan any evasive action early with several options. High swell and waves occasionally will extend hundreds of miles ahead of a hurricane and deny some maneuverability. You can assist us in making better forecasts by making observations as follows:

1. When within 300 miles of tropical storms or hurricanes, transmit weather observations at least every 3 hours. Hourly reports when within a storm (winds over 48 knots) would be very beneficial, if ship routine permits.
2. In the "Remarks" section of the Ship's Weather Observations," Form 72-1A, and the weather message, Form 72-4A, include the lowest pressure and/or the highest wind and the time of occurrence since the last synoptic (00,06,12, or 18Z) report, if:
   a. The pressure is 5 millibars lower and/or,
   b. The wind is more than 48 knots and has increased 15 knots since the last synoptic report.
3. Use the prefix STORM for the weather message when the wind is 48 knots or more. Also, use the name, if in a named storm or hurricane.
4. Example of weather report message: STORM (standard weather report) HURRICANE JULIA 1420Z MIN PRES 949 HPA 1440Z MAX WIND 90 KN GUSTS TO 120 KN

The position on each weather report automatically updates your AMVER position making it infinitely easier to find your ship and give assistance, if required.

Communication procedures are a separate enclosure to this letter in TIPS TO THE RADIO OFFICER.

The weather report messages from your ship do make a difference in each weather forecast and hurricane advisory. Please don't treat this responsiblity lightly because you are our source of weather information at your position. Thank you for your past efforts and please continue them in the future. I wish you a safe hurricane season.

Sincerely,
Jerome W. Nickerson
Marine Observations Program Leader

Tips to the Radio Officer

Julie L. Houston
National Weather Service, NOAA
Silver Spring, MD

WEATHER MESSAGE COMMUNICATIONS

SITOR or CW Weather Reports through the U.S. Coast Guard

U.S. Coast Guard radio stations are first priority for receiving weather messages from ships properly equipped. This is because there is no further cost to the government and the messages are immediately available to the AMVER. No address preamble (i.e. OBS METEO WASHDC) is necessary. Start all weather messages with the ship's radio call sign.

INMARSAT Weather Reports

INMARSAT equipped ships may transmit weather messages using the following procedures after the message is composed off-line:

1. Select U.S. Coast Earth Station Identification Code 01.
2. Select routine priority.
3. Select duplex telex channel.
4. Initiate the call.
   Upon receipt of GA+ (Go Ahead).

5. Select dial code for meteorological reports, 41, followed by the end of selection signal, +.
   41+ (or 00 230 89406+)
6. Upon receipt of our answerback, NWS OBS MHTS, transmit the ships call sign and the weather message only. Do not send any other preamble. Example:
   GA+
   41+
   NWS OBS MHTS
   WLXX 29003 99131 70808 41998 60909 10250 2021/ 40110 52003 71611 85264 22234 00261 20201 31100 40803 .....
   The 5 periods indicate the end of the message.
7. Terminate the call with the manual disconnect.

SITOR or CW Weather Reports through Specified U.S. Commercial Radio Stations

If the U.S. Coast Guard cannot be contacted and the ship is not INMARSAT equipped, as a back-up, U.S. commercial radio stations specified in the publication "Radio Stations Accepting Ship's Weather and Oceanographic Observations" may be contacted to relay weather messages. The preamble, "OBS METEO WASHDC," is required. The ship's radio call, the first group of all weather messages is never combined; however, the groups following should be combined to make 10-character groups to minimize the cost.

Example (see INMARSAT message):
OB METEO WASHDC
WLXX 2900399131 7U80841998 6090910250 2021/40110 5200371611 8526422234 0026120201 3110040803
Only the current observation should be transmitted.

U.S. High-Sea Forecast and Warning Areas

Weather report messages will be accepted from the following forecast and warning areas without cost to the Ship or company. Charges are handled automatically if the prescribed procedures are followed:

Pacific:	160°E eastward to coast and north of 25°S
Atlantic:	35°W westward to the coast, including Gulf of Mexico and the Caribbean, and north of 3°N
Guam:	Between 5°N and 25°N and from 135°E to 180°
INMARSAT ONLY:	South of 60°S

Single Sideband, SSB (Radiotelephone) Voice Weather Reports

Ships (yachts) equipped with SSB radios may report to U.S. Coast Guard radio stations (radio telephone equipped) and transmit a weather message in the ship synoptic code by phonetically pronouncing the numbers of the code. The advantage of this method is the report does not have to be reformatted to enter the computer systems, but is seen as another ship report.

Timeliness

All weather messages are degraded by time, so they should be transmitted as soon as possible. Early reports are used in all programs, computer and manual; however, reports arriving after a computer cut-off time cannot be used in that program. All reports have some use even if delayed.

Weather Reports in Coastal Waters

The weather starts to change as soon as the air passes from a land to a water surface. Coastal ship reports often provide early warning of developing storms so any reports you can make in coastal waters will be very useful to the forecasters.

CORRECTIONS TO WORLDWIDE MARINE WEATHER BROADCASTS (January 1984 Edition)

Page	21
Add:	aguaceros under Precipitation Column.
Page	41
Add:	Pratas to map. Place in blank space next to Balintang. Bohai to map. Place in blank space across from East Sea. Huanghai to map. Place in blank space next to Cheju. Donghai to map. Place in blank space next to Nagasaki
Page	65
ADD:	
TIME:	0100
PRODUCT:	F,W
AREA:	North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY:	438, 4255, 6430, 8697, 12726, 16926.5
SOURCE:	CFH, Halifax, NS, Canada
TIME:	0130
PRODUCT:	IB
AREA:	North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY:	438, 4255, 6430, 8697, 12726, 16926.5
SOURCE:	CFH, Halifax, NS, Canada
TIME:	0430
PRODUCT:	A
AREA:	North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY:	438, 4255, 6430, 8697, 12726, 16926.5
SOURCE:	CFH, Halifax, NS, Canada
0530	CFH, Halifax, NS, Canada
Delete:	F, from PRODUCT Section and 4 from NOTE Section.
Add:	12726, 16926.2 to FREQUENCY Section.
Page:	66
ADD:	
TIME:	1300
PRODUCT:	F,W

AREA: North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY: 438, 4255, 6430, 8697, 12726, 16926.5
SOURCE: CFH, Halifax, NS, Canada

TIME: 1330
PRODUCT: IB
AREA: North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY: 438, 4255, 6430, 8697, 12726, 16926.5
SOURCE: CFH, Halifax, NS, Canada

Page 66
TIME: 1630
PRODUCT: A
AREA: North Atlantic waters north of 35°N and west of 35°W.
FREQUENCY: 438, 4255, 6430, 8697, 12726, 16926.5
SOURCE: CFH, Halifax, NS, Canada

1730 CFH, Halifax, NS, Canada
Delete: F, from PRODUCT Section and 4 from NOTE Section.
Add: 12726, 16926.2 to FREQUENCY Section.

Page 78
0306 XSC Shanghai, P.R. China
Delete: 0306 from TIME Section replace by 0300.

Page 79
0906 XSC Shanghai, P.R. China
Delete: 0906 from TIME Section replace by 0900.

Page 82
DELETE:
TIME: 0400
PRDDUCT: S,F,LR
AREA: Waters out to 300 NM offshore from Cape Flattery to Pt. St. George.
FREQUENCY: 472
SOURCE: NMW, ASTORIA, OR., USA SINGAPORE
FIG: 19

Page 83
DELETE:
TIME: 1830
PRODUCT: S,F,LR
AREA: Waters out to 300 NM offshore from Cape Flattery to Pt. St. George.
FREQUENCY: 472
SOURCE: NMW, ASTORIA, OR., USA SINGAPORE
FIG: 19

Page 92
Change: Mid Page, North Atlantic West to North Atlantic East.

Page 93
Delete: EJK under Spain

Page 111
ADD:
TIME: 1033
PRODUCT: W
AREA: Baleares, Palos, Alboran areas (Western Mediterranean).
FREQUENCY: 1680(A3)
SOURCE: Valencia, Spain Singapore FIG: 12

Page 113
2000 EJK, Valencia, Spain
Delete: 2000 from TIME Section replace by 2003 and EJK from SOURCE

Page 114
ADD:
TIME: 0145
PRODUCT: W,S,F
AREA: Malacca Straits, Andaman Sea and South Sea China.
FREQUENCY: 2760, 8728.2
SOURCE: 9VG, Singapore FIG: 20

TIME: 1345
PRDDUCT: W,S,F
AREA: Malacca Straits, Andaman Sea and South Sea China.
FREQUENCY: 2760, 4369.8
SOURCE: 9VG, Singapore
FIG: 20

Page 140
Add:
21. Transmissions are on two frequencies only. Selection of the particular two to be used for each broadcast is on the basis of the two best suited for propagation to Wake Island (2000 nautical miles). The two transmissions are simultaneous.

Page 141
0600 CFH, Halifax, NS, Canada
Delete: W18 from PRODUCT Section replace by P.
Add: 2 to NOTE Section.

0616 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

ADD:
TIME: 0700
PRODUCT: A
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

TIME: 0708
PRODUCT: N
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

0800 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

0900 CFH, Halifax, NS, Canada
Delete: W24 from PRODUCT section replace by P.
Add: 2 to NOTE Section.

0916 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

1000 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

Page 142
1100 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

1120 CFH, Halifax, NS, Canada
Delete: 1120 from TIME Section replace by 1121. 42/48 from PRODUCT Section.
Add: 2 to NOTE Section.

ADD:
TIME: 1300
PRODUCT: I
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

TIME: 1330
PRODUCT: N
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

TIME: 1500
PRODUCT: A
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

1516 CFH, Halifax, NS, Canada
Delete: 1516 from TIME section replace by 1514.
Add: 2 to NOTE Section.

1616 CFH, Halifax, NS, Canada
Delete: 1616 from TIME section replace by 1614.
Add: 2 to NOTE Section.

1720 CFH, Halifax, NS, Canada
Delete: 1720 from TIME Section replace by 1721.
Add: 2 to NOTE Section.

1800 CFH, Halifax, NS, Canada Delete: W18 from PRODUCT section replace by P.
Add: 2 to NOTE Section.

1816 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

ADD:
TIME: 1900
PRODUCT: A
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

Page 142
TIME: 1908
PRODUCT: N
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

2000 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

ADD:
TIME: 2021
PRODUCT: S,P
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

TIME: 2100
PRODUCT: P
AREA: Western North Atlantic.
FREQUENCY: 4271, 6330, 10536, 13510, 122.5
SOURCE: CFH, Halifax, NS, Canada NOTE: 2

2116 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

2200 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

DELETE:
2235 CFH, Halifax, NS, Canada

2300 CFH, Halifax, NS, Canada
Add: 2 to NOTE Section.

2320 CFH, Halifax, NS, Canada
Delete: 2320 from TIME section replace by 2321.
Add: 2 to NOTE Section.

Page 158
0030 KVM70, Honolulu, HI, USA

0046 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

0645 KVM70, Honolulu, HI, USA

0650 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE:
NOTE: 21

Page 159
0653 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

1140 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: A
SOURCE: NOTE: 21

1900 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: A
AREA: 60N-10S, 115W-155E
SOURCE: NOTE: 21

1914 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

1200 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1214 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1228 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1242 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1256 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1310 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1324 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1338 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

Page 159
1352 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1406 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWIG:
AREA: 60°N - 05°N, 165°W - 101°W.

1420 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1434 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1448 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1502 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1516 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: A
AREA: 60°N - 05°N, 123°E - 161°W.

1530 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: A
AREA: 60°N - 05°N, 165°W - 101°W.

1648 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1702 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1716 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 58°N - 10°N, 177W - 110°W.

1738 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 58°N - 05°N, 120°E - 173°W.

DELETE:
TIME: 1800
PRODUCT
AREA: North Pacific Ocean.
FREQUENCY: 2122, 4855, 8494, 9396, 14826, 21837
SOURCE NPM, PEARL HARBOR, HI, USA
NOTE: 15

1830 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1844 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1858 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

1912 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1926 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

Page 160
1940 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

1954 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 10°N, 160°E - 90°W.

2019 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

2033 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

2047 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

2101 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

Page 160
2115 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

2129 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

2143 NPM, Pearl Harbor, HI, USA
PRODUCT: A(36)
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

2157 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

2211 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 13°N, 115°E - 105°W.

2234 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 123°E - 161°W.

2248 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 60°N - 05°N, 165°W - 101°W.

2302 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 58°N - 10°N, 177°W - 110°W.

2324 NPM, Pearl Harbor, HI, USA
REPLACE THE FOLLOWING:
AREA: 58°N - 05°N, 120°E - 173°W.

Page 162
0030 KVM70, Honolulu, HI, USA
0046 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

0650 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
SOURCE: NOTE: 21

0653 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

Page 163
1914 KVM70, Honolulu, HI, USA
REPLACE THE FOLLOWING:
PRODUCT: N
SOURCE: NOTE: 21

DATA TO ADD TO THE MARINE COMMUNICATIONS BOOKS:

Marine meteorological information broadcast in the Gulf of Mexico:

Telegraphic: 9,500 kHz, 7,570 kGz, 7,000 kHz.
In the Pacific, from Mazatlan and Socorro Island:
Telegraphic: 6,976.80 kHz
Telephonic:

	Channel	
4,800	1	3,592 kHz
13,043	2	5,395 kHz
	3	7,345 kHz

These stations transmit sea-level atmospheric pressure each 6 hr at 00,06,12, and 18Z.

They belong to the Agriculture and Hydraulics Resources Department and operate jointly with the Navy Department.

Stations receiving weather messages 24 hours a day are:

Isla Socorro - XBRP

Telephonic	Telegraphic
4,890 kHz	1 - 2,182 emergency
13,500 kHz	2 - 2,638 emergency
19,000 kHz	3 - 2,757.5 CW
8 - 9,800 CN	4 - 4,155 CW
9 - 11,530 CN	5 - 5,740 CW
10 - 12,530 CN	6 - 8,340 CW
	7 - 9,790 CW

Cayo Arcas - ESARC

Telephonic
4,890 kHz
9,800 kHz

The Editor's Desk

EDITORIAL

The following Editorial by John F. Houghton is reprinted from The Marine Observer with the permission of the Controller of her Britannic Majesty's Stationary Office.

Every day at the Central Forecasting Office at Bracknell some 32,000 observations covering all parts of the earth's surface are fed into the Cyber 205 -- the mammoth computer at Bracknell which solves the atmospheric circulation model equations to produce our global forecasts. Since about three-quarters of the earth's surface is covered by ocean, the contribution made by observations from ships is absolutely indispensable. Towards the provision of these global observations the UK certainly plays its part. In July 1984, 527 ships were reporting observations which represented a substantial fraction, namely six per cent, of ship reports world-wide.

It is sometimes said that with more observations from satellites the need for observations from ships and other surface platforms is reduced. In fact the opposite is the case. Satellite observations require conincident observations from the surface for comparison and validation purposes, and further, there are key quantities such as surface pressure which as yet cannot be measured from space. Also, as models develop and improve they become more and more hungry for observations which are required to be increasingly accurate and available at finer horizontal resolution.

A further requirement for ships' observations arises from the need to continuously update the unique Marine Data Bankwhich we hold at Bracknell which contains 58 million observations taken over the past 130 years. New data are added at the rate 1.3 million observations per year, of which some

19 percent (240,000) are provided from ships of UK origin. Marine engineers and offshore operators have an increasing need for such data. They are also vital in investigations currently being pursued in international experiments such as the World Climate Research Programme which are looking into the causes of climate change and whether man's activities are influencing the climate.

The meteorological community, therefore, will continue to press for more and better observations from around the oceans so that in turn the models can be improved and better forecasts provided to ships and to shipping operators.

Over the last few years as the models and the input data to them have improved, so have the forecasts. Forecasts for 48 hours ahead now have similar skill to forecasts 24 hours ahead of a few years ago, and useful skill is now possible up to four or five days ahead. Particularly noticeable durng the past year or so has been our ability to predict over the British Isles major changes in weather type, for instance changes from blocking situations to westerly air flow, five or six days ahead. This improved capability together with the wave model which has been developed at Bracknell means that we are able to provide routeing information for ships over all the world's oceans which ships' masters and shipping operators are finding of great value. With the advent of satellite data communications for ships through Inmarsat the links between our meteorological service and shipping can be closer than ever before to our mutual advantage.

It therefore gives me great pleasure at the beginning of this New Year 1985 to salute all those at sea who so generously co-operate with us in this global meteorological enterprise.

BRIDGE CLOSES SEAWAY

The bridge across the St. Lawrence River at Valleyfield, Quebec jammed half open on November 21, 1984. A broken axel was part of the problem causing the bridge to jam. Repair of the bridge was not finished until late on December 9, almost 3 weeks later. Cold weather and high winds contributed to the delay even though the temperatures averaged above normal.

Reports of the number of vessels delayed varied but one estimated 99 were stalled inside the Seaway downbound and 61 were waiting for upbound passage.

ICEBERG THREATENED GRAND BANKS RIGS

A 500,000 ton iceberg threatened the drilling rigs on the Grand Banks off Newfoundland on December 7, 1984 causing two to cease operations (fig. 17). Over 100 crew members were evacuated. The oil company took 56 of the 93 crew off the SEDCO 706 by helicopter. Later operations were abandoned and the rig was towed 5 mi northwest of its position as the iceberg came within 10 mi. The SEDCO 706 is an outstanding weather reporter.

Another oil company airlifted 40 personnel from the BOW DRILL 3 which was drilling just south of SEDCO 706. The BOW DRILL 2 also had personnel evacuated and both were moved according to one report.

Figure 17.-- This U.S. Navy photograph shows an iceberg in Baffin Bay towering 160 ft above the water.

All three rigs were back in position on the 10th. The iceberg was estimated to be moving at 0.7 kn in a southerly direction.

This was the second time this winter that drilling operations were threatened. Last winter rigs had to be moved six times due to iceberg threats.

SAIL ASSISTED AQUA CITY

Figure 18 shows the sail assisted AQUA CITY. She is another of the new sail-assist vessels operating in the North Pacific trade from Japan to the pacific Northwest. The ship was delivered on July 19, 1984. The first observation forms were sent to the ship's agent on August 3, and the first PMO visit was on September 18, 1984 during bunkering in Seattle's Elliot Bay. The ships officers hae been excellent participants in the weather observing program.

Figure 19 shows Donald Olson, PMO Seattle, presenting a Certificate of Membership in the Voluntary Ship Observing program to Captain Cesar J. Baricuatro, Master, with Captain T. Kajitani, Port Captain, Showa Line, Ltd., in the background.

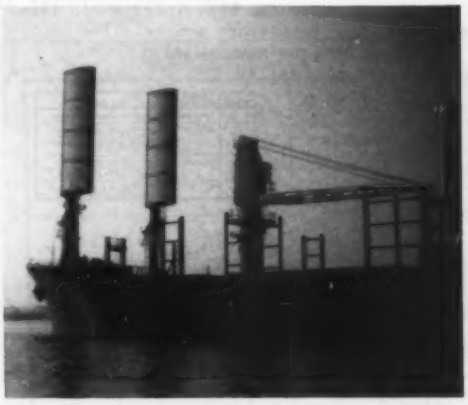


Figure 18.--The AQUA CITY with sails folded which measure 11 x 15 meters when they are extended. The sails are computer operated. Photo by PMO Don Olson.

Figure 19.--PMO Donald Olson presents Certificate of Membership in the Voluntary Ship Observing Program to Captain Baricuatro.

FERRY BOAT SINKS

The 700 ton ferry VENUS sank off Marinduque Island, about 120 mi southeast of Manila, on October 28, 1984. The ferry was reported carrying 240 people and 115 were rescued. The ferry reportedly sank in high waves. Two navy ships searched for survivors.

On the 29th the container ship LORCON 8 sank in bad weather off the coast of Batangas province, about 50 mi south of Manila. All 19 crewmen were rescued.

The bad weather was caused by tropical storm Warren which lashed Luzon Island and the Visayas region. Warren had winds up to 50 kn. He moved northwestward into the South China Sea.

HEAT INDEX

Figure 20 shows the Heat Index which takes into account air temperture and relative humidity. The Heat Index gives an apparent temperature due to the affect of the humidity and how it can affect a person.

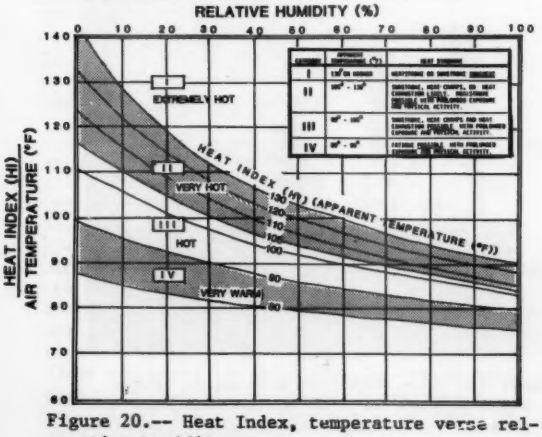


Figure 20.-- Heat Index, temperature verse relative humidity.

ICE IN LENA RIVER

Ice in the Siberian River Lena trapped more than 100 ships for some 20 days. They were carrying supplies to northern Siberian settlements.

The cargo ships were cut off on the outward journey from the port of Tiksi to settlements at the mouth of the Yana River. They were immobilized in the shallow waters of the Lena Delta. Two icebreakers worked for about 3 weeks to free the convoy. The exact time this occurred was not available, but it was reported on October 3 that the resupply of the northeastern Siberian settlements was complete.

Last year 55 ships were trapped in the ice and one ship was crushed by ice in the Chukshi Sea.

NOAA ANNOUNCES NEW EDITION OF NAUTICAL CHART PUBLICATION

A new edition has been issued of a publication that identifies and explains symbols and abbreviations used on nautical charts produced by the Government.

The 58-page publication, "Chart No. 1, Nautical Chart Symbols and Abbreviations," was prepared by the Commerce Department's National oceanic and Atmospheric Administration (NOAA) and the Defense Department's Defense Mapping Agency.

The National Ocean Service (NOS), the issuing organization for NOAA, said that for the first time this edition (the eighth) includes many internationally accepted charting symbols and an extensive glossary of terms used on foreign charts. Descriptions of the U.S. Coast Guard aids to navigation system and an explanation of the International Association of Lighthouse Authorities Buoyage System are also included

Completely redesigned, Chart No. 1 is available through authorized NOS chart sales agents and the NOS Distribution Branch (N/CG33), National Ocean Service, Riverdale, Md. 20737, for $2.50.

BALTIMORE CLIPPER SHIP TO TAKE OBSERVATIONS

Baltimore's clipper ship, the PRIDE OF BALTIMORE, will provide official marine weather observations for the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) during a voyage to Europe.

Leaving Baltimore on March 31, 1985 for Bermuda and the Azores, it will provide high-seas observtions to NOAA's National Weather Service. Later it will assist European meteorological services on its 18-mo trip.

"Observations from the Pride will help fill the void of high-seas information in our observational network," said Richard E. Hallgren, weather service director.

Jerry Nickerson, a marine observations official for the service said these reports will include sea and air temperature readings, air pressure, wave heights, estimated wind speeds and wind direction, in computer-compatible form.

This information will be relayed by the U.S. Coast Guard radio stations to the National Meteorological Center in Camp Springs, Md., for use in developing forecast guidance products. These products aid meteorologists in preparing marine forecasts at four high-seas National Weather Service Forecast Offices on both coasts and Hawaii.

NOAA TO STUDY GREENHOUSE EFFECT OF ATMOSPHERIC GASES

A study of atmospheric gases that act like a greenhouse above the earth, trapping the sun's heat and having the potential to warm the global climate, has been launched by the National Oceanic and Atmospheric Administration (NOAA).

The Commerce Department agency's Environmental Research Laboratories in Boulder, Colo., that have found atmospheric concentrations of trace gases -- chlorofluorocarbons, nitrous oxide, methane, and tropospheric ozone -- appear to be increasing. Combined they could cause a global warming, equivalent to that expected from carbon dioxide.

Like carbon dioxide, the trace gases let sunlight enter the earth's atmosphere but block the exit of the sun's heat back into space -- the greenhouse effect. Scientists agree on the existence of the effect, but differ about the extent to which it is affecting the climate.

NOAA's research initially will center on the development of instruments and techniques for monitoring and measuring the concentrations of the various trace gases. The scientists will also create computer programs to assess possible climate changes.

The gases arise from a wide variety of man-made and natural sources. Chlorofluorocarbons, for example, are exclusively man-made, while methane is believed to have a large natural source. Many of the gases play key roles in tropopheric chemistry and air quality. Ozone, for instance, is the source of substances that control the chemistry of the troposphere and also is an oxidant that, in substantial concentrations, can damage plants and human health.

Results of an in-depth study would permit climate predictions and assessments to be based on all radiatively important trace gases, not just CO_2 alone. Additionally, accurate assessments could be made of the benefits of controlling man-made sources of these species. By addressing this problem at an early stage, the cost of a crisis response at a later time can be avoided.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones world-wide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log
October, November and December 1984

WEATHER LOG, OCTOBER 1984 -- This was an active storm month with more of them occurring during the last half than the first half, They were spread over a wide north-south band from Kap Farvel south to latitutde 40°N in the west and between latitutdes 70°N and 45°N in the east, primarily over the Norwegian Sea. There were quite a few storms that moved eastward over Hudson Bay and several turned southeastward to continue across the salt water. Several storms formed just off the northeast coast of the United States. There was juncture area centered near 55°N, 35°W where the East Coast and Canadian storms crossed paths. There was a concentration of storm tracks off the coast of Norway, north of Scotland.

The monthly mean sea-level pressure centers were normally located but more intense (fig.

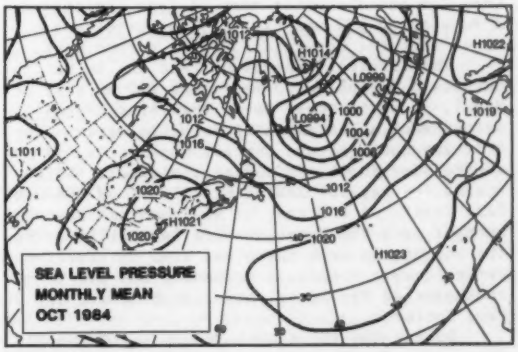


Figure 21.-- Monthly mean sea-level pressure.

21). The pattern closely matched climatology. The Icelandic Low was 995 mb near 61°N, 30dW, 7 mb lower than normal. The Azores High was 1023 mb near 33°N, 30°W, 4 mb higher than normal. There was secondary 999 mb low near 63°N, 08°W and a secondary 1021 mb high near Philadelphia. High pressure dominated the midlatitude continental areas.

There were two significant mean sea-level departure centers, both minus 8 mb. One was near 60°N, 30°W and the other near 60°N, 05°E. The zero isoline approximated Kap Farvel south to 42°N latitude, east to Brest, France, and south of latitude 70°N. There was a plus 5 mb anomaly center near Quebec, and several plus 3 to 4 mb centers approximately along latitude 33°N between the American and African coasts.

At 700 mb the center of circulation was near the Icelandic Low at 61°N, 35°W. The long-wave trough stretched southward, then southwestward to near 40°N, 50°W. The flow was close to being zonal between latitudes 40°N and 60°N with a northerly component over the American coast and a southerly component over the European coast. The gradient between latitudes 40°N and 60°N along longitude 35°W was 390 meters, much greater than the normal 270 meters, resulting in higher than normal wind speeds.

Hurricane Josephone occurred this month.

Some Climatology--On October 17, 1950 a small-powerful hurricane hit Miami with 122 mi/hr winds. On the 20th in 1770 a great storm struck eastern New England causing extensive coastal damage, and the highest tide in 47 years. On the 23d in 1761 a hurricane struck southeast New England, the most violent in 30 yr. Thousands of trees blocked roads in Massachusetts and Rhode Island.

Extratropical Cyclones--On the first day of the month tropical storm Hortense was south of St. John's. Tropical depression Isidore was east of Cape Hatteras. The Azores High was well-developed over the central ocean. At midweek there was a strong storm over the Bay of Biscay. The end of the week found two strong HIGHs across the 40°N to 45°N latitude band, one off Cape Cod and the other east of Cape Finisterre. A developing LOW was east of Kap Farvel and moved over the Norwegian Sea the second week.

The tropical depression that was to be hurricane Josephine formed about 600 mi east of Miami, in an easterly wave, the first of the second week. The midlatitude HIGHs were drifting eastward and another moved southeastward out of Canada at midweek. This opened the way for Josephine to move up the U.S. East Coast. A LOW east of Newfoundland and another over the Norwegian Sea intensified. By the end of the week there was high pressure centered over France, a deepening LOW was southeast of Kap Farvel and Josephine was off Cape Hatteras.

During the third week the above LOW moved across the Shetland Islands, Josephine turned extratropical on the 19th and dissipated. A LOW deepened rapidly over Oslo, Norway.

The fourth week started with both Bermuda and Azores High cells. The low-pressure centers were weak. By midweek both HIGHs had drifted eastward. At the end of the week a large-deep LOW was 500 mi southeast of Kap Farvel. At the end of the month this LOW had weakened and high pressure dominated the ocean.

The first significant storm of the month. The first of the month there was a large multi-centered low-presSure area northwest of the Continent. As Hortense dissipated a LOW formed in the trough to the north on the 3d. This circulation quickly consolidated the low pressure centers over the Bay of Biscay. At 1200 on the 4th the central pressure was 974 mb (fig. 22).

Figure 22.-- The storm as it appeared at 1522 on the 4th. NOAA Image.

At 0000 ROMEO already had 26-ft seas. The OSTROV KOTLIN (44°N, 09°W) measured 66-kn west winds and 30-ft swells. A ship withthe call letters ZUQA (43°N, 10°W) reported 58-kn northwest winds and 49-ft waves. At 1800 the DALLINGTON (44°N, 12°W) had 60-kn northwest winds, 17-ft seas, and 39-ft swells. By 0000 on the 5th the storm center had crossed the coast of France and weakened rapidly. It turned northward and crossed Denmark and dissipated on the Norweigian coast on the 7th.

This storm caused considerable damage in France and Spain. In northern Spain six people were killed and dozens injured. Winds reached hurricane force. Highway and rail traffic was disrupted in both countries. In southwest France about 60,000 homes were without electricity. Winds blew in the windows at the Corunna airport and injured two air traffic controllers. Waves up to 40-ft were reported in the Bay of Biscay. The yacht JIMLYN was abandoned by the crew and rescued by the GLAFKOS.

The following ships appeared to have suffered damage in this storm: CARISTRA, FIVE STAR, NORDHEIDE, REBEKA OMA, and TRIO.

This storm was over northern Alberta, Canada on the 1st but did not affect the ocean area until the 5th when it was over the Labrador Sea. At 1200 the FORT NELSON (59°N, 48°W) reported 48-kn east winds and 15-ft waves. On the 6th the WNDB (58°N, 38°W) measured 45-kn west winds 17-ft seas, and 39-ft swells. At 0000 on the 7th the winds had died down to 15-kn but the swell was still 25 ft.

At 1200 on the 8th the storm was 976 mb on

the northeast coast of Iceland. The NIVI ITTUK (59°N, 23°W) measured 75-kn west winds and 20-ft waves. The ARCTIC (58°N, 26°W) measured 57-kn winds and 26-ft waves. The CHERRY VALLEY reported 30-ft seas. On the 9th a Soviet ship (57°N, 12°W) measured only 35-kn northwest winds but reported 30-ft seas. The storm was out of the range of most ships on the 10th.

This storm formed east of Cape Race on the 9th as a frontal wave. It started to deepen on the 10th and was 984 mb by 1200 on the 11th. The LICORNE ATLANTIQUE (43°N, 25°W) had 50-kn southwinds. On the 12th the MAGNUS JENSEN (60°N, 32°W) had 54-kn northeast winds and 20-ft seas, CHARLIE had 17-ft seas, and 25-ft swells. Early on the 13th the PACIFIC CHALLENGE (60°N, 27°W) had 44-kn winds, 17-ft seas and 33-ft swells. On the 14th another storm absorbed this one.

This was the storm that absorbed the one described above. It formed not far from Great Slave Lake in northern Canada on the 9th. It tracked eastward and on the 11th plummetted southeastward to 150 mi southeast of Cape Raceby 1200 on the 12th. At this time it turned eastward and then northward on the 13th. There were a few gales on the 12th. At 1200 on the 13th the 980 mb storm was near 46°N, 37°W (fig. 23).

Figure 23.--The storm at 1653. Circulation from the previously described storm can be seen north of latitude 55°N. NOAA Image.

The ATLANTIC CORONA (45°N, 44°W) had 57-kn northeast winds, 17-ft seas, and 26-ft swells. The SEA-LAND LEADER (42°W, 42°W) measured 42-kn northwest winds, 12-ft seas, and 25-ft swells. On the 14th the SEA-LAND INDEPENDENCE (48°N, 36°W) measured 50-kn winds and 15-ft waves. The LICORNE ATLANTIQUE (45°N, 38°W) had 26-ft swells.

This storm had now absorbed the previous described storm and doubled its area of circulation. On the 15th there were a few gale reports and the PACIFIC CHALLENGE at 56°N, 45°W had 37-kn winds and 23-ft swells. The storm was gone on the 16th.

The point of occlusion of a frontal system that moved over the Labrador Sea from Canada produced this LOW on the 25th. On the 26th there were several reports of winds near 50 kn and waves up to 20 ft. SEDCO 706 (47°N, 48°W) measured 48-kn northwest winds and 17-ft seas. The JOHN LYKES (38°N, 40°W) measured 51-kn southwest winds and 8-ft seas.

Figure 24.-- A large area of instability is in the southwest quadrant between 45° and 50°N. NOAA.

At 1200 on the 27th the storm was 964 mb near 56°N, 32°W (fig. 24) There were lots of wave reports over 20 ft in the southwest quadrant. The CHAMPLAIN (44°N, 09°W) reported 49-ft swells. The FRED J. AGNICH (50°N, 50°W) measured 76-kn northwest winds. The SEA-LAND EXPRESS (44°N, 30°W) measured 34-kn west winds and 25-ft waves. The EXXON WILMINGTON (46°N, 36°W) measured 54-kn west winds, 13-ft seas, and 30-ft swells. On the 28th CHARLIE measured waves as high as 26 ft. LIMA had waves up to 23 ft. The NAJA ITTUK (62°N, 29°W) had northeast 60-kn winds. She still had 60-kn north winds with 23-ft seas at 61°N, 39°W on the 29th. The CETRA VELA (51°N, 28°W) measured 60-kn west winds and 33-ft swells.

The storm was weakening and decreasing in size on the 29th and dissipated late on the 30th.

Casualties--There were three reports of casualties in fog. The ISLA PLAZA and ALBANY contacted at Bridgeport, NJ. The EARL GODWIN struck the breakwater at St. Helier harbor. The HEIDE CATRIN and STENA CARRIER collided in the western Baltic Sea.

The INTEROCEAN II broke tow in the English Channel in high seas and winds gusting to 50 mi/hr on the 22d. The tow was reconnected. The LADY ODIEL sank in a severe storm off the Dutch coast with the loss of three crewmen.

These ships reported heavy weather damage: ANANGEL DILIGENCE, CAST OTTER, EL HASHAISHI, FORUM HOPE, LIBRA, LONDONBROOK, NAVENA, OSLOFJORD, PRESIDENT QUEZON, SANTORINI, and TINOS.

WEATHER LOG, NOVEMBER 1984--There were major differences in the pattern of the paths of the cyclones this month from climatology. There was no preferred path. Storms that came off the east coast of the United States and Maritime Provinces of Canada tended to curve northward once over water and one continued westward. Only two storms out of central Ganada continued eastward past Kap Farvel. Cyclones that approached Iceland tended to track a large counter-clockwise loop around Iceland. There were a number of cyclones over Europe and the Mediterranean, mainly during the first half of the month.

The monthly mean sea-level pressure pattern featured a 994 mb Icelandic Low near 58°N, 27°W (fig. 25). Climatology shows a 1003 mb center at 62°N, 30°W and a 1005 mb center at 68°N, 00°. The Azores High was 1023 mb near 30°N, 30°W. The climatic High is 1019 mb 300 mi north. The usual high pressure center over the U.S. East Coast was 1022 mb, 4 mb higher than normal.

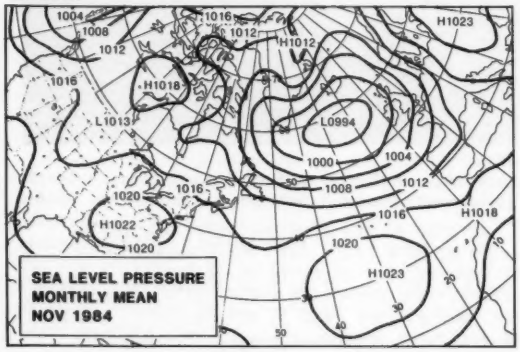


Figure 25.— Monthly mean sea-level pressure.

The primary feature of the sea-level pressure anomaly chart was a minus 13 mb center near 52°N, 20°W. Most of the ocean north of latitude 40°N had lower than normal pressure. The Azores High produced a plus 4 mb center and the East Coast High a plus 3 mb center.

The upper-air flow at 700 mb was mainly zonal between latitudes 35° and 55°N between the two shore lines. There was an anomalous LOW east of Kap Farvel near 60°N, 36°W. There was a sharp long wave trough that approximated longitude 10°W. The normal trough over the eastern U.S. was very shallow.

Hurricane Klaus occurred this month. Since 1931 only ten other hurricane have ocurred in November.

Some Climatology--On November 9, 1913 a rapidly deepening cyclone sank eight ore carriers on Lake Huron drowning 270 sailors. Cleveland, Ohio was buried under 22 in of snow and the winds averaged 50 mi/hr with gusts to 79 mi/hr. On the 12th in 1968 a severe coastal storm produced high winds and record snows from Georgia to Maine. The winds reached 90 mi/hr in Massachusetts. On the 14th in 1974 a storm dropped 15 in of snow on Buffalo and 30 in on the south shore of Lake Erie. On the 26th, 1888 a late season hurricane brushed the East Coast with heavy rain and gale-force winds.

Extratropical Cyclones--The month started with high pressure over the Maritime Provinces and the central ocean. LOWs were over the higher latitudes with another large HIGH over eastern Europe. By midweek a LOW had developed west of the Bay of Biscay. A large area of high pressure was south of a line from Belle Isle to the Canary Islands. Tropical storm Klaus formed near the end of the week. High pressure dominated most of the ocean with centers over the central ocean and the east coast of Greenland. Another LOW was west of the Brest Peninsula.

The second week high pressure continued to dominate except for the two cyclones. By midweek the central HIGH had moved southeastward and weakened. A HIGH was over the U.S. East Coast. There were many low-pressure centers with a severe storm south of Iceland. Klaus was a hurricane. By the end of the week Klaus was extratropical. There were strong HIGHs over eastern Europe, the Azores and U.S. East Coast.

LOWs were the dominate feature except for the Azores High as the third week started. At midweek a severe storm was south of Kap Farvel and at the end of the week another severe LOW was over the central ocean.

The severe LOW was the only significant weather feature at the beginning of the fourth week and it moved over Scandinavia by midweek. At the end of the week another strong LOW was near Iceland. High pressure was south of latitude 45°N. At the end of the month the LOW controlled the northeastern ocean, a strong Azores High the central ocean and weak LOWs wereoff the U.S. East Coast.

A weak LOW was over Kap Farvel on November 1. It tracked southeastward and by the 3d had intensified. CHARLIE had 35-kn winds with 23-ft waves. The 1200 chart indicated a new center had explosively formed near 45°N, 19°W at 986 mb. The ROLLNES (50°N, 20°W) had 30-kn east winds and 33-ft swells from the west. The FICHTELBERG (47°N, 22°W) reported northerly 60-kn winds. On the 4th the storm weakened but there were still some 25-ft waves. The night of the 4th two yachts and a trawler were blown aground north of Casablanca. The catamaran RUA-MAO-TORU off Casablanca broadcast an SOS and six people on board were rescued by the ROSA S.

The LOW divided into three centers on the 5th and the original center dissipated over France.

Northern Quebec produced this cyclone on the 5th. It moved northeastward to Davis Strait and then southeastward to Kap Farvel on the 9th. Tvigtut, Greenland had 45-kn east winds. The REYNOLDS (53°N, 48°W) had 50-kn winds, 30-ft seas, and 33-ft swells. On the 10th the swells increased to 36 ft. The ZIEMIA OPOLSKA (51°N, 22°W) reported measuring 64-kn west winds as the front passed. The PACIFIC COURAGE (49°N, 37°W) had 47-kn northwest winds, 25-ft seas, and 30-ft swells. The Q.E. II had 30-ft seas near 51°N, 28°W. The CANBERRA (48°N, 18°W) had 63-kn winds, "46-ft seas", and 25-ft swells on the 12th. The WALTER RICE (46°N, 22°W) had 25-ft

swells. ROMEO had 26-ft seas most of the day.

The storm had turned northward on the 11th and on the 12th and 13th looped counterclockwise south of Iceland. At 1200 on the 13th the storm was 981 mb near 60°N, 20°W. The W.C. VAN HORNE 58°N, 39°W reported 64-kn west winds. The LUDWIGSHAFEN EXPRESS at 54°N, 22°W had 25-ft swells. The storm remained stationary through the 15th. On the 14th the CHAMPLAIN (56°N, 39°W) measured 58-kn winds and 17-ft seas. The DUSSELDORF EXPRESS at 58°N, 20°W had only 30-kn winds, 7-ft seas, but 33-ft swells.

On the 15th the storm was rapidly disintegrating. The winds had decreased but there were still a few high wave reports.

This LOW originated over the Pacific off of San Francisco on the 7th. On the 13th the storm center moved over the Bay of Fundy. Tropical storm Klaus was moving northward along 50°W and about to become extratropical. On the 14th the WACGAMAW (33°N, 65°W) measured 28-kn winds, 8-ft seas, and 25-ft swells. By 1200 on the 15th the pressure had plunged to 982 mb. There were a lot of high wind and wave reports. The CANBERRA (37°N, 52°W) reported 60-kn southwest winds, 17-ft seas, and 25-ft swells. The CAPE RODNEY (34°N, 59°W) had 44-kn winds, 17-ft seas, and 41-ft swells.

The storm now split into two centers, the original turning northward, then westward into Labrador. The new center tracked eastward to the English Channel and became the severe storm.

There continued to be many winds over 50 kn and waves over 20 ft on the 16th. This was particularly true over the Grand Banks as the drilling rigs and support ships faithfully reported. Three reported winds of 60 kn and 17- to 20-ft seas. They were the VCNP, VSBC, and WGZL. The CANBERRA at 33°N, 59°W reported 36-ft swells. On the 17th the ALEMANIA EXPRESS (41°N, 33°W) had 37-kn northwest winds and 35-ft swells. The MARTINDYKE (47°N, 30°W) had 52-kn winds, 26-ft seas, and 36-ft swells. Many other ships also reported. The original storm over the Labrador Sea was no longer of any concern.

At 1200 on the 18th the new center was 976 mb near 49°N, 11°W. The winds were decreasing but high swells still persisted. The storm crossed over England on the 19th and was no longer of concern to ships. The INGMAR and WHYALLA sank during this storm.

The Gulf of St. Lawrence was the birthplace of this storm on the 19th. It was 972 mb at 1200 on the 20th about 500 mi east of Cape Race. There were winds over 50 kn and waves up to 30ft. The SEA-LAND PRODUCER (44°N, 39°W) had 58-kn southwest winds and 20-ft waves. The SACHEM (38°N, 60°W) measured 50-kn northwest winds with 30-ft swells. By 1200 on the 21st the storm was 954 mb near 54°N, 33°W. The storm covered the ocean from coast to coast and latitudes 35°to 65°N. There were many winds over 60 kn and waves over 25 ft. The CITY OF PERTH (47°N, 34°W) had 58-kn west winds, 12-ft seas, and 39-ft swells, THE ERLANGEN (50°N, 29°W) had 52 kn winds and 26-ft swells.

By the 22d a second LOW center had formed

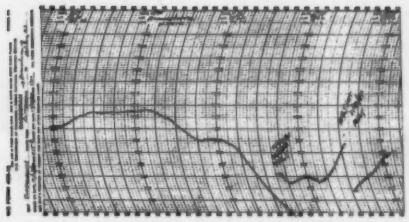


Figure 26.-- A copy of the barogram from the SEA-LAND INDEPENDENCE showing the two low pressure centers that she passed very close to. Forwarded by PMO Bob Baskerville.

to the east of this one. The high winds and waves continued. The ARCTIC reported the highest winds of 80-kn out of the southwest at 52°N, 23°W with 33-ft swells. The SEA-LAND INDEPENDENCE passed very near both centers on the 22d registering two sea-level pressure readings of 957 mb (fig. 26). Since she was north of and near the centers her winds were light. The storm was still 956 mb on the 23d. The TABLE BAY (48°N, 06°W) found 60-kn winds, 46-ft seas,and 49-ft swells. On the 24th the SEA-LAND CONSUMER (48°N, 07°W) had 45-kn winds, 17-ft seas, and 41-ft swells.

The storm moved over Europe on the 22d through the 24th causing extensive damage. It hit southern Germany particularly hard. Winds were registered in excess of 108 mi/hr. Nine people were reported killed in France and Germany and seven in Poland. Millions of dollars of damage was done; roofs destroyed, tidal flooding, trees and powerlines down. Tides up to 16 ft above normal were reported.

The following ships were damaged: PIRATA, SEPHINE, BLACK WATCH, CRETAN HERO, STENA CARIBICA, CARAPAU, NYUTA, and SARDINHA. The GOLFSTROM and FYLRIX sank.

This storm started as a weak frontal wave over the south tip of Florida. It was first analyzed on the 0000 chart of the 22d. There was a strong 1040 mb HIGH over the Ohio Valley. The OVERSEAS NEW YORK (24°N, 88°W) had 50-kn north winds, 13-ft seas, and 20-ft swells at 1800. On the 23d the storm was off the east coast of

Figure 27.-- The MERCEDES 1 hard aground next to a sea wall at Palm Beach, FL. WIDE WORLD PHOTO

Figure 28.-- A motel and sea wall damaged by the high winds and waves. WIDE WORLD PHOTO

Florida. The MERCEDES 1 (fig. 27) was blown against a seawall at Palm Beach when she dragged her anchor in high winds and seas after her engine failed. The crew got safely ashore.

There were winds of 58 mi/hr at Vero Beach, 55 mi/hr at Melbourne, 46 mi/hr at Titusville, and 44 mi/hr at Cocoa Beach. There was much flooding as 9 in of rain fell and the high windsand waves caused extensive beach erosion (fig. 28). Only 200 ft of a new 1,100 ft pier at St. Augustine remained. The TROPIC MIST lost three containers overboard 12 mi off West Palm Beach that were washed ashore. The barge No. 30 lost tow departing Jacksonville, Fla. and went aground. The C6FA (33°N, 77°W) reported 42-kn northeast winds and 16-ft seas. The storm was north of Nassau on the 24th. The WARSCHAU (28°N, 80°W) had 48-kn north winds and 20-ft seas. The storm continued eastward and weakened on the 25th.

Labrador produced this storm on the 24th and it moved southeastward. The DAPHONE (44°N, 54°W) had 52-kn winds at 1200 east of the front. On the 25th there were two other LOWs south and southwest of this one, both stronger. There were several reports of winds higher than 50 kn and waves above 25 ft. The FARLAND (45°N, 38°W) reported 68-kn southeast winds, 17-ft seas, and 30-ft swells. The ATLANTIC STAR (42°N, 35°W) had 50-kn south winds, 13-ft seas, and 49-ft swells. By the 26th the three systems had combined into one. At 1200 the pressure was 964 mb. There were four reports of winds above 60 kn. The CG 2389 (45°N, 62°W) reported measuring 73-kn winds. The ELDVIK (54-N, 14-W) reported 68-kn out of the south. The FARLAND had 30-ft swells.

At 1200 on the 27th the storm was 940 mb over the south coast of Iceland (fig. 29). The LOW stretched from Newfoundland to Norway and as far south as latitude 40°. There were many winds of 50 kn and greater and waves over 20 ft. The W.D. ITCHEN (56°N, 05°W) had 64-kn south winds, no waves reported. A SHIP at 58°N, 25°W had 33-ft swells. On the 28th another LOW formed south of the Denmark Strait. The high winds and waves continued into December 1 as the cyclone gradually weakened.

The tow parted on the SOVEREIGN EXPLORER near 61°, 01°E in southwesterly 50-to 60-kn winds, rough seas and heavy swells. Helicopters

Figure 29.--This 1 km resolution NOAA image shows the sheer west wall of the frontal cloud band.

removed 66 people as a safety precaution. The tow was reconnected prior to any damage or collision.

Casualties--There were two collisions due to fog. The CHELM and ZGORZELEC on the 8th and the TENNA WINTHER and ATLANTIC DENHOLM On the 2d in the North Sea. The ARCTIC suffered ice damage on the 6th.

These vessels reported heavy weather damage at unspecified times and/or place: BMC-1, BERLIN, CITADEL HILL, DOCK EXPRESS 20, ELSTREE GRANGE, GOLDEN DOLPHIN, LACANDON, LENA WESSELS, MAKYUT, RIVIERA SKY, SAADALLAH, and TOPEKA.

The tug CELTIC sank in heavy seas off Long Island, NY on the 17th. She was towing the barge CAPE RACE which was missing. The tug was found in 80 to 100 ft water and four bodies of the crew of six were recovered. The AMAZING GRACE disappeared off the coast of Delaware on the 15th with nine men on board.

These three ships sank or grounded in the Mediterranean Sea in heavy weather. The ANGELA grounded at Les Saintes Marie de la Mer on the 15th. The PANOREA sank near 43°N, 17°E early on the 15th. Crew of four could not be found. The LPG carrier BRIGITTA MONTANARI sank in the Adriatic near the island of Zirje on the 16th in a gale. Three crewmen were missing.

WEATHER LOG, DECEMBER 1984--The majority of the storm centers this month tracked over a relatively narrow path once over water. Two paths combined off Labrador north of Newfoundland. One was from the Great Lakes Basin and the other was from the U.S. East Coast. From approximately 52°N, 55°W the path was northeastward to slightly south of Kap Farvel to the west coast of Iceland and into the Greenland Sea. These were only a few isolated storms over the remainder of the ocean and Europe. Higher than normal sea-level

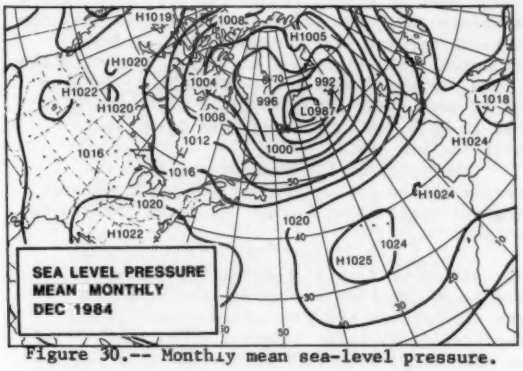


Figure 30.-- Monthly mean sea-level pressure.

pressure over Europe and Russia effectively blocked most storms.

The Icelandic Low at 987 mb was 13 mb lower than normal and normally located near 53°N, 35°W (fig. 30). The usual High over northern Greenland was 1005 mb, 10 mb lower than normal. The 1025 mb Azores High was 4 mb higher than normal at 36°N, 30°W, about 300 mi southwest of its normal position. There were also two 1024 mb subcenters, one at 40°N, 15°W and the other over eastern Spain. The influence of the 1046 mb Asian High, 11 mb higher than normal extended westward into Europe. The climatic High over the southeastern U.S. was 1022 mb, 2 mb higher than normal and covered a larger area.

The sea-level pressure departure chart (anomaly) featured a minus 15 mb center over the surface sea-level pressure LOW and another minus 15 mb center over north-central Greenland. Thezero isoline over water was from Belle Isle to 52°N, 35°W to the Faroe Islands and then northward. The Azores High produced a plus 6 mb anomaly center near 40°N, 40°W. The above normal pressure over Europe varied from plus 4 mb over Spain and Ireland to 10 mb over Norway and Poland.

At 700 mb the center of circulation was near normally located over northern Baffin Island but 350 ft lower than normal. The subtropical High was 100 ft higher than normal. This produced a much tighter gradient and higher winds. The flow over the eastern United States and Canada was zonal, turning east-northeastward, then northeastward over the northeastern part of theocean.

Hurricane Lili formed the middle of the month as a subtropical storm and lasted until Christmas Eve. She was only the third hurricane of record to form in December since 1871. See the annual article in the Winter 1984 edition of the Mariners Weather Log.

Some Climatology--On December 9, 1917 a severe winter storm hit the Ohio Valley and Great Lakes producing 2 ft of snow and hurricane force winds at Buffalo, NY. on the 20th, 1898, a big snowstorm hit eastern Wisconsin. At Racine 30 in fell and drifts were 15 ft around Milwaukee. On the 23d in 1811 a winter storm struck Long Island with a foot of snow and temperatures near zero. Many ships were wrecked and in some cases entire crews perished. Christmas day of 1983 was one of the coldest ever recorded across the eastern two-thirds of the nation. About 125 cities set new low records that morning. On December 26, George Washington crossed the ice clogged Delaware River and marched on Trenton, NJ in the midst of snow and sleet thus surprising and capturing many of the British garrison.

Extratropical Cyclones--The month started with multiple LOWs over the north Latitudes and high pressure south of latitude 35-N. By midweek the LOWs had partially consolidated. At the end of the week there were two large LOWs over the water and high pressure was building westward over Europe. A HIGH was over the water east of New England.

The second week the latter HIGH moved eastward and a cut-off LOW formed west of Portugal. At midweek there was a large HIGH over France and another south of Cape Race. The subtropical LOW that would become hurricane Lili formed. At the end of the week high pressure dominated the ocean area.

The third week there were large strong HIGHs over Quebec and the Azores. Another LOW was west of Gibralter. The subtropical LOW drifted southward then northward. A large HIGH was off the U.S. East Coast at midweek. LOWs were moving across the north latitudes. At end of the week the subtropical LOW became Lili. The Azores High was still strong and a significant storm was over Iceland.

The fourth week found large HIGHs and ridge extending from the Azores High across Europe and Asia. Another HIGH was over Newfoundland and a LOW over Iceland. By midweek the high pressure ridge extended into the United States. Lili dissipated over the Dominican Republic. A severe storm was centered east of Kap Farvel. At end of the week another large severe storm was over Kap Farvel with cyclonic circulation as far south as latitude 30°N. At end of the month there was a large Bermuda High and a HIGH over northern Europe. There was a significant LOW over the Mediterranean and another south of Kap Farvel.

This storm moved over Newfoundland on the 1st. The rigg WGZL (47°N, 49°W) measured 49-kn west winds. By 1200 on the 2d the storm was 970 mb near 57°N, 28°W. The CEDAR TRADER (45°N, 34°W) had 50-kn winds, 13-ft seas, and 33-ft swells. The CHESTNUT HILL measured 55-kn northwest winds, 7-ft seas, and 12-ft swells at 56°N, 28° W. The winds decreased to 48-kn on the 3d but the swell increased to 21 ft. The W.C. VAN HORNE (48°N, 31°W) had 50-kn winds and 33-ft swells. This center suddenly dissipated as another center formed east of Kap Farvel just as suddenly.

The CHESTNUT HILL now at 54-N, 35-W measured 52-kn winds and 25-ft swells from this new storm on the 4th. This new LOW was absorbed by one from the west on the 6th.

This was another case of jumping centers. A LOW formed near Cape Hatteras on the 3d. It moved northeastward along the coast and at 1200 on the 5th was near Belle Isle. On the 1800

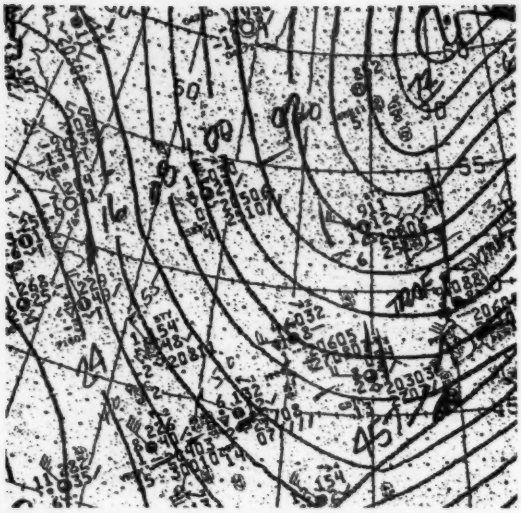


Figure 31.— A part of the 1200 chart of December 6.

chart the center had jumped 500 mi to the east. On the 5th the drilling rigs on the Grand Banks reported 50-kn winds. There were three reports of winds of 60-kn or greater on the 6th (fig. 31). The MARIA J. (45°N, 43°W) estimated 64-kn winds from 300-, 17-ft seas, and 46-ft swells. At 1200 in the 7th the 980 mb storm was 100 mi south of Iceland. The higher winds were now in the strong gale category, but the ROVER (47-N, 19-W) had 30-ft swells. The storm was west of Nordkapp on the 8th. The NORDORN sank in the North Sea on the 8th. Four crewmen were missing.

This was a fast developing storm. It formed as a frontal wave on the Carolina coast by the 0000 chart of the 6th at 1014 mb. By 1200 it was 998 mb near New York City. At 0000 on the 7th it was 988 mb and 970 mb at 1200. At 1800 on the 6th the MAASSLUIS (40°N, 67°W) had 55-kn south winds and 20-ft seas. On the 7th there were many winds over 50 kn. For some reason about half the ships did not report waves. The ships and rigs on the Grant Banks were measuring 50-to 60-kn south winds and only 13-ft seas. The IRVING OCEAN (49°N, 64°W) measured 60-kn west winds and 20-ft waves.

At 0000 on the 8th the storm was 960 mb near 57°N, 55°W. The ROWAN-JUNEAU (44°N, 60°W) measured 45-kn winds and 25-ft swells. The LINCOLNSHIRE (42°N, 55°W) had 33-ft swells. The storm moved northward through Davis Strait late on the 8th. There were probably still some high winds but no ships to report them. The Maritime provinces produced this cyclone on the 9th. Twenty-four hours later at 0000 on the 10th it was 990 mb northeast of St. John's. There were winds over 50 kn over the Grand Banks and south of the center. At 1200 on the 11th the 962 mb storm was over the Denmark Strait. The FALCON (55°N, 21°W) had 44-kn winds from the south and 36-ft seas. The FRITHJOF (59°N, 43°W) measured 64-kn west winds and 28-ft seas.

On the 12th a frontal wave formed on the front west of Brest, France and developed into a separate LOW. The original LOW circled over the Denmark Strait. The ICEPORT (61°N, 33°W) reported 72-kn winds but no waves. The GRONLAND (59°N, 42°W) estimated the winds as 55 kn with 26-ft seas. The AMERICAN EAGLE (42°N, 26°W) had 33-kn winds, 15-ft seas and 25-ft swells with the new LOW.

The original LOW disappeared from the charts on the 13th. The new LOW wandered over England until the 17th but was of no concern to ships.

The plains of Kansas produced this storm on the 21st. Southerly flow started affecting the offshore on the 22d. Three American registered observers reported winds of 51 to 62 kn near 44°N, 59°W with seas near 10 ft and one reported swells of 28 ft. This storm was moving through the southern ciruclation of a storm centered over Northern Quebec. The reporters on the Grand Banks again contributed valuable observations. There winds were out of the south at 60 to 70 kn with seas only up to 15 ft. CHARLIE had swells up to 23 ft. On the 24th the winds over the Grand Banks were near 50 kn. The storm was 970 mb near 60°N, 37°W. CHARLIE measured 40-kn winds and 25-ft seas. There were still winds of 50 to 60 kn on Christmas Day (fig. 32). Twenty foot seas were prevalent. The AVON FOREST (46°N,33°W) had 30-ft swells. On the 26th ROMEO reported 48-ft seas. The ATLANTIC SONG nearby reported 49-ft swells. The storm center was gone by the 27th but high swells persisted in the vicinity of ROMEO.

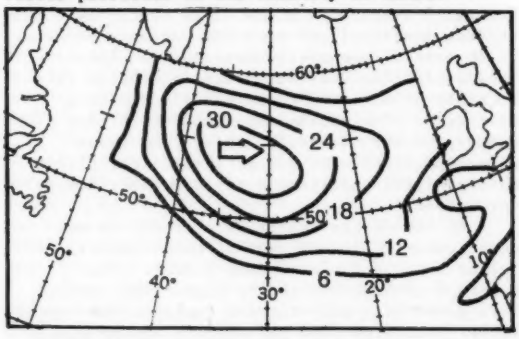


Figure 32.— The sea wave analysis for 1200 December 25.

The tug IMPLACABLE sank south of Portsmouth in the English Channel on the 24th in heavy weather. Ten persons were rescued. These three vessels had weather damage on the 26th; FREE ENTERPRISE, IBN BAJJAH, and SMIT HOUSTON. The CAPE THISTLE appeared to have been involved with this and the next storm.

A frontal wave formed over Lake Erie on Christmas Eve. By 1200 Christmas Day it was 990 mb over the Gaspe Peninsula. There were measured winds of 50 to 60 kn over the Grand Banks. The IRVING NORDIC (49°N, 65°W) measured 52-kn winds in the Gulf of Lawrence. At 1200 on the 26th the storm was 952 mb near Kap Farvel (fig. 33). There were many storm force winds this day. The PACIFIC COURAGE (48°N, 14°W) had

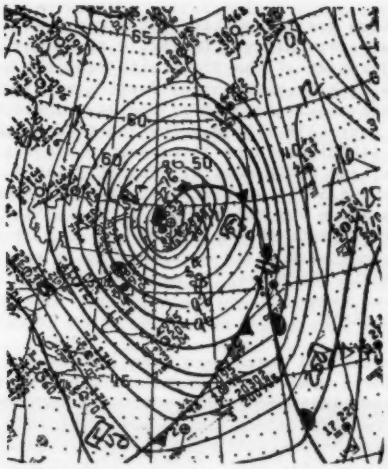


Figure 33.-- The 0000 chart of December 26 shows the central pressure as 965 mb. Observations are few in the North Atlantic at 0000.

55-kn winds 17-ft seas, and 36-ft swells.

On the 27th the 966 mb LOW was near Tvigtut, Greenland but its circulation stretched from Canada to Ireland and south to 35°N over the central part of the ocean. Another LOW had formed in the southern part of the circulation. The FIRMNES (48°N, 40°W), south of this new center had 60-kn west winds, 17-ft seas, and 46-ft swells. There were several other reports of 60 kn or greater. The ROWAN-JUNEAU (44°N, 60°W) measured 65-kn winds but only reported 7-ft seas and 12-ft swells. CHARLIE and ROMEO both had 25-ft swells. At 2100 the MEERKATZE (56°N, 51°W) was near the center of the storm with 60-kn winds, 23-ft seas and 961.8 mb pressure.

On the 28th the new LOW was turning northward, then northwestward to join and absorb the old LOW. The AVON FOREST (43°N, 45°W) had 60-kn west winds, 26-ft seas, and 33-ft swells. The VSBG (46°N, 25°W) had only 27-kn winds but reported 46-ft swells. The storm started to fall apart on the 29th.

The KALLIFIMOS and WASHINGTON appeared to have suffered weather damage in this storm.

Casualties--The MASTER PETROS went aground in fog on the 11th at Boothville. The ZAMORA encountered ice and suffered damage. The SOFIA sank near Crete after being abandoned by the crew in bad weather.

These vessels contacted other vessels in heavy weather at Alexandria on the 12th and 13th; EURCO BANNER and EL HASSEN, KAVO PEIRATIS and IRINI P., and RECALADA LIGHT with unnamed other vessels.

The POLYDORUS arrived Brest on the 19th with cargo shifted. The ANGEMED went aground in the Canary islands in bad weather when the tug PULLMAN returned to Las Palmas for new tow ropes. The VICTORY 3 had weather damage on a voyage from Mobile to Amsterdam. The AL KARAMAH went aground the night of the 31st at Augusta, Sicily. The MANTHOS developed a list in heavy weather on the 14th on a voyage from New Jersey to Algeciras.

The yacht MEDECINS SANS FRONTIER capsized 600 mi south of Bermuda on the 15th in the circulation associated with the subtropical storm that later became hurricane Lili. The five crewmen were rescued by a Japanese tanker after the emergency alarm transmitter was activated and picked up by satellite.

North Pacific Weather Log

October, November and December 1984

WEATHER LOG, OCTOBER 1984--There were the normal number of storm tracks this month but they were dispersed differently than normal. There were two areas of concentration, one east of Kamchatka and the other over the Gulf of Alaska. This produced two low-pressure centers on the mean sea-level pressure chart rather than the climatic one over the Gulf of Alaska. The tracks were not well concentrated in one path and they crossed each other at many angles, particularly in the Kamchatka area. The majority of the storm centers were between latitudes 45° and 60°N.

The mean sea-level pressure chart (fig. 34) shows two 1005 mb low-pressure centers rather than the one climatic 1001 mb center near Cook Inlet. The two centers were located near 55°N, 150°E and 55°N, 149°W. There also were two high pressure centers, a 1023 mb near 33°N, 138°W and a 1019 mb near 31°N, 172°E. These

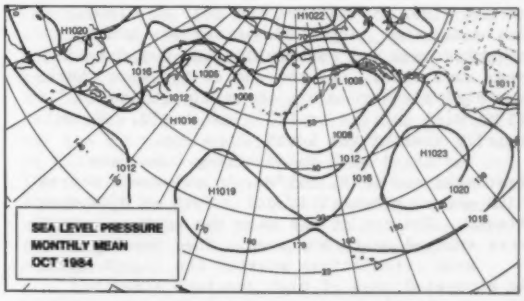


Figure 34.-- Monthly mean sea-level pressure.

were near their climatic positions but the eastern center was 4 mb higher than normal. A trough that paralleled approximately longitude 165°W separated the two HIGH centers.

The anomaly chart indicated a minus 7 mb center over the Sea of Okhotsk near 58°N, 145°E, and a minus 6 mb center near 40°N, 165°W. There was another minus 3 mb center east of Japan near 34°N, 148°E. There was a plus 8 mb center west of the Bering Strait near 64°N, 180°. The pressure was higher than normal north of latitude 50°N between longitudes 140°W and 170° E. The Pacific High produced a plus 3 mb center near 36°N, 137°W.

The 700 mb pattern was quite different from normal. There were three significant troughs, one over the Sea of Japan, another approximating longitude 170°W and another along the Baja Peninsula. There were two LOW centers of circulation, one near Kodiak Island and the other near 62°N, 130°E. There was an anomalous HIGH over the northwest Bering Sea near 60°N, 176°E

October was a big month for tropical cyclones. There were eight over the western ocean; typhoons Ogden, Phyllis, Thad, Vanessa, and Warren, and tropical storms Nina, Roy, and Susan. The eastern ocean produced only two, tropical storms Rachel and Simon.

Some Climatology--On October 12, 1962 the great Columbus Day storm struck the west slope of the Cascade Mountains. Winds reached hurricane force with gusts to 100 mi/hr. More than 3.5 billion board feet of timber was blown down, and the storm claimed 48 lives. On the 21st, 1934 another severe windstorm lashed the northern Pacific coast. Winds reached 87 mi/hr at North Head, Washington. Waves of more than 20 ft occurred even on inland waters of Puget Sound and Lake Washington. In Washington 22 persons were killed.

Extratropical Cyclones--October started with a large LOW over the Gulf of Alaska. At midweek there was a parade of LOWs eastward along the 45° to 50°N latitude belt. There were weak high-pressure centers over the subtropics. At the end of the first week another large LOW was over the Gulf of Alaska.

The second week started with a large cyclonic circulation with three centers over the north ocean. A HIGH was centered over northern Japan. Tropical cyclone Ogden developed south of the HIGH. At midweek the Gulf of Alaska hosted another large LOW. Ogden was moving northeastward and and Phyllis and Roy formed near each other. At the end of the week there was high pressure along the midlatitudes (40° to 45°N) with centers at 170°E and 140°W. Susan briefly visited the South China Sea.

The third week found strong LOWs near Kamchatka and 40°N, 165°W. At midweek a strong HIGH was over Hokkaido, and a 1048 mb HIGH over Alaska. The end of the week the subtropic HIGHs were shifted south and weak. Thad developed.

Weak circulations started the fourth week. An elongated area of high pressure stretched from the Arctic Ocean southward along longitude 170°E. The Pacific High was stronger than usual. By midweek Thad was extratropical and Vanessa formed. Two LOWs were over the northern waters. The end of the week found weak circulations except for Vanessa. At the end of the month the Pacific High and another over Alaska blocked the North American coast. By November 1 a large cyclonic circulation dominated the ocean north of latitude 35°N.

This storm was the extratropical conversion of tropical storm Maury. On the 2d there were a few gales east of the front with tropical storm Nina helping development by feeding moist air into that area. At 0000 on the 3d the storm was 980 mb near 49°N, 175°W. The SEA-LAND FREEDOM (48°N, 175°E) measured 35-kn west winds with 13-ft seas, and 25-ft swells. The 3FJV (49°N, 171 W) measured 57-kn west winds. At 0000 on the 4th the storm was 966 mb near 51°N, 163°W. The SEA-LAND FREEDOM (50°N, 173°W) measured 27-kn north winds with 17-ft seas, and 33-ft swells. The CAMSELL (53°N, 143°W) measured 55-kn southeast winds but only 13-ft seas. The POLAR COMMAND (56°N, 155°W) had 50-kn winds and 20-ft seas.

On the 5th there were many reports of storm-force winds. The CAMSELL now had 47-kn southeast winds and 25-ft seas. The PRESIDENT PIERCE reported 63-kn west winds. The ARCO FAIRBANKS (58°N, 142°W) had 55-kn east winds and 20-ft waves. The RAVEN (59°N, 139°W) had 50-kn southeast winds and 20-ft swells. Late on the 5th a new center formed south of the original one and quickly became the primary center. At 0000 on the 6th it was 966 mb near 48°N, 152°W. The wind force was decreasing but high wave reports increased. The SEA-LAND FREEDOM (49°N, 148°W) had 33-ft swells. The BELO RIO (44°N, 144°W) had 30-ft swells. The ARCO ALASKA (44°N, 127°W) had 25-ft swells. The fishing vessel NORSELANDER (50°N, 130°W) estimated 60-kn southeast winds and swell up to 30 ft.

The storm was 956 mb near 54°N, 143°W at 1200 on the 7th. There were many gale to strong gale wind reports. The WESTWARD VENTURE (53°N, 135°W) measured 48-kn south winds, 23-ft seas, and 26-ft swells. The TOHBEI MARU (41°N, 146°W) had 30-ft swells. On the 8th another storm was moving into the Gulf and this one quickly disappeared.

This storm intensified over the Sea of Japan on the 2d. On the 3d the PRESIDENT LINCOLN (40°N, 146°E) found 50-kn winds with only 13-ft waves. By 0000 on the 4th the storm was 974 mb near 50°N, 155°W. The SEA-LAND DEVELOPER (45°N, 154°E) measured 45-kn west winds and 25-ft seas and swells. The DAIHO MARU (45°N, 151°E) reported 46-kn west winds, 23-ft seas, and 33-ft swells. The FRANCIS SINCERE No. 6 (46°N, 179°E) measured 54-kn winds with only 13-ft waves on the 5th. The SEA-LAND INNOVATOR (46°N, 168°W) had 25-ft swells. The storm quickly died.

This storm formed over Sakhalin Island on the 5th and on the 8th it intensified as it moved into the Gulf of Alaska. On the 9th at 0000 the storm was 972 mb near 48°N, 147°W. The THAMES MARU (50°N, 134°W) measured 49-kn south winds, 17-ft seas, and 26-ft swells. The EHIME MARU (43°N, 139°W) measured 35-kn west winds, 13-ft seas, and 30-ft swells. On the 10th the GLACIER BAY (54°N, 134°W) found 50-kn winds and 20-ft seas. The PENROD 67 (47°N, 138°W) had only 30-kn winds with 30-ft swells. The storm was 960

mb. By the 11th the storm was again weakening off the Alaska panhandle.

This storm was the extratropical extension of typhoon Ogden. By 1200 on October 10 the storm was extratropical and raced eastward under the westerly zonal upper air flow. At 0000 on the 12th the storm was 986 mb off the Washington coast. The PACKING (43°N, 139°W) had 20-ft swells. By 1200 the storm had plunged to 958 mb near 50°N, 134°W (fig. 35). The PARIZEAU (52 N, 134°W) measured 60-kn southeast winds. The BROOKS RANGE (52°N, 137°W) had 65-kn northeast winds and 25-ft swells. The CARIBBEAN HIGHWAY(49°N, 129°W) measured 50-kn winds, 13-ft seas, and 33-ft swells. There were several 50- to 60-kn winds and wave reports over 25 ft early on the 13th but after the storm moved ashore about 0000 the winds quickly decreased but there were still some swells over 25 ft which continued into early on the 14th.

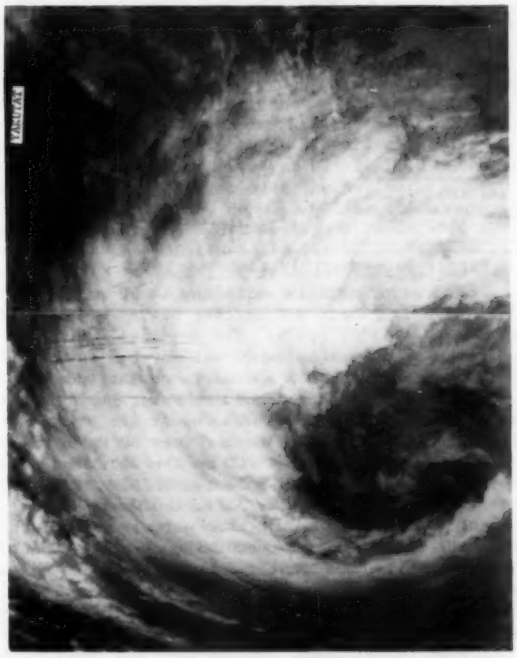


Figure 35.--This NOAA VHRR image(1 km resolution) shows the storm and detail of the southeast coast of Alaska.

Winds along the coasts of Oregon and Washington gusted up to 60 mi/hr. At Whidbey Island the gusts were 40 mi/hr and at Newport, Oregon they gusted to 60 mi/hr. On the coast of southern British Columbia at Cape St. James they were clocked at 100 mi/hr. A gust of 70 mi/hr was observed in the Strait of Juan de Fuca.

Typhoon Phyllis contributed to the development of this storm. A weak LOW formed east of northern Honshu on the 13th. Typhoon Phyllis was about 500 mi to the southeast and pumped warm-moist air northward. At 0000 on the 14th the LOW was 988 mb east of Hokkaido. The PRESIDENT HOOVER ws at 37°N, 150°E with 23-ft swells from 110° while her winds were 20 kn from the west. The swells were propagated from Phyllis. At 0600 the GREEN MAYA (42°N, 158°E) measured 43-kn southeast winds, 23-ft seas, and 33-ft swells. At 0000 on the 15th the storm was 973 mb near 55°N, 160°E. There were many strong winds and high waves reports. The CHIKURA MARU (52°N, 167°E) measured 57-kn southeast winds, 17-ft seas, and 23-ft swells. The WORLD FINANCE (40°N, 154°E) measured only 25-kn winds but the swell was 30 ft.

The storm was over northern Kamchatka on the 16th. The FERRY KIKAI (53°N, 169°E) measured 22-kn winds and 26-ft swells. The storm weakened over eastern Siberia but continued northward to latitude 80°N.

The Shikoku Basin produced this LOW on the 16th. At 1200 on the 17th it was a small tightly wound storm. The SEA-LAND FREEDOM (38°N, 150°E) measured 48-kn south winds with 25-ft ses and swells. At 0000 on the 18th it was 996 mb near 44°N, 152°E. The VAN CONQUEROR (42°N, 156°E) measured 53-kn southeast winds and 18-ft waves. Only a few miles away the TOYOTA MARU 15 measured 54-kn winds from the same direction with 23-ft seas and swells. The OCEAN CROWN (42°N, 155°E) had 33-ft swells. Later in the day this circulation combined with another LOW over the Sea of Okhotsk. This system turned northward and a USSR ship north of the center had 48-kn east winds. On the 19th this storm was over Siberia.

The central ocean produced this cyclone on the 16th on a front out of a LOW over Siberia. By the 18th this LOW combined with the circulation of another LOW to form a large cyclonic circulation. On the 17th the other LOW had produced some strong winds. The JAVA WINDS (44° N, 178°W) measured 62-kn north winds and 20-ft waves.

At 0000 on the 18th the storm was 992 mb near 44°N, 169°W. The YOUNG SPLENDOR (41°N, 179°E) measured 45-kn north winds, 17-ft seas, and 31-ft swells. The swell was 26 ft on the 19th. The TAKASAGRO (39°N, 170°W) had 55-kn northwest winds and 20-ft waves. The NEPTUNE CORAL (54°N, 169°W) measured 60-kn northeast winds on the 20th. The SAMUEL S. (44°N, 178°E) had 30-ft swells.

By the 21st this large circulation had split into four centers weakening the gradient but the cyclonic circulation stretched 2,800 mi on thesouthwest-northeast axis and 2,000 mi on the northwest--southeast axis. On the 22nd the SAMUEL S. (45°N, 172°W) measured 38-kn northeast winds and 30-ft swells. By the 23d the large cyclone had broken into several circulations.

Northerly flow over the Sea of Japan helped this cyclone form on the 26th. There were gale reports on the 28th with sea and swell reports over 20 ft. The CHIKURA MARU (40°N, 152°E) measured 51-kn west winds. The PRESIDENT EISENHOWER (41°N, 163°E) had 30-ft swells. At 0000 on the 29th the storm was 976 mb near 49°N,

168°E. The ORIENTAL EXECUTIVE (44°N, 178°E) measured 50-kn southeast winds. The SAGAMI MARU (45°N, 161°E) had 33-ft waves. The OCEAN TARPON (56°N, 166°W) found 45-kn southeast winds and 15-ft waves. On the 30th the NORTHERN DAWN (56°N, 159°W) had 40-to 50-kn winds gusting to 60 kn. Cold Bay, Alaska had southeast 44-kn winds. On the 32st there were many winds near 50 kn and over and waves above 20 ft. The SHIN BEISHU MARU (52°N, 142°W) measured 52-kn winds from 110- and 26-ft waves. Kodiak, Alaska had 43-kn east winds. The SCULPIN (56°N, 157°W) had easterly 50- to 60-kn winds and 25-ft swell. In the same area the PACIFIC SUN estimated the winds at 80 kn and the MARINE EXPORTER easterly at 60 to 65 kn. On November 1 there were many wind reports over 50 kn and waves over 20 ft. The WPFX (41°N, 157°W) estimated 60-kn west winds, 17-ft seas, and 41-ft swells. The GALVESTON estimated 65-kn winds. The ARCO JUNEAU called the winds 50 kn from the southeast with 41-ft swells. Later in the day the remains of typhoon Vanessa entered the circulation. The high winds and waves continued into the 2d. The storm was 968 mb off Vancouver Island. The EVER SHINE (42°N, 149°W) measured 51-kn west winds, 23-ft seas, and 36-ft swells. The storm center moved ashore on the 3d. There were still highwinds and waves. The EXXON HOUSTON (47°N, 129°W) had 52-kn west winds and 33-ft seas. There were still high swells on the 4th.

On the 1st there were strong winds along the Pacific Coast. Wind gusts of 65 mi/hr were reported in the Seaside and Cape Blanco area of Oregon. The high continued into the 2d. Winds gusted to 58 mi/hr at Eureka, Calif. Large redwood trees were downed and aircraft damaged at Crescent City.

This storm was the extratropical extension of typhoon Vanessa. She was extratropical by 1200 on the 31st. The CHIRUA MARU (45°N, 172°E) measured 50-kn winds. On November 1 the TOWER BRIDGE (43°N, 173°W) measured 58-kn west winds and 23-ft seas. Several others had 50-kn winds and waves of 20 to 25 ft. Late on the 1st this storm joined the center of the storm above.

Casualties--Surprisingly with the number of severe storms this month there were relatively few casualties. The ALRAZI suffered heavy weather and damage during the 10th to 13th near Japan. The GARDENIA had damage 15th to 17th. The JANG YUNG No. 9 and SEIUN MARU collided at Mutsure on the 21st in gusty winds. The MAH KIM requested heavy weather damage survey at Takumaon the 10th. The SOZO MARU No. 10 contacted the Naibo wharf on the 3d in strong winds.

Other Casualties: The AUSTRALIAN EXPORTER had weather damage between Auckland and Melbourne on the 17th and 18th. The JAYAKARTA lost 35 containers and 55 were damaged near 35°S, 116°E on the 30th in heavy weather. The KALYN listed due to timber breaking lose due to poor lashings on a voyage from Singapore to Mauritius.

WEATHER LOG, NOVEMBER 1984--There was no doubt about a primary storm path and where it was this month. The primary path stretched from Sakhalin Island (48°N, 142°E) east-northeastward to Attu Island to Bristol Bay. Another less concentrated path was eastward from near 46°N, 150°W to about 47°N, 133°W where it curved northward into British Columbia. The first path closely matched climatology while the second path split the difference between two climatological paths.

The mean sea-level pressure chart matched climatology only in general pattern. The Aleutian Low was 990 mb near 55°N, 172°E. This was many miles from the normal position over the Gulf of Alaska (fig. 36). The Pacific High was 1023 mb near 30°N, 145°W, 3 mb higher than normal but near the normal position. An Arctic High was 1027 mb, 9 mb higher than normal near 80°N, 180°.

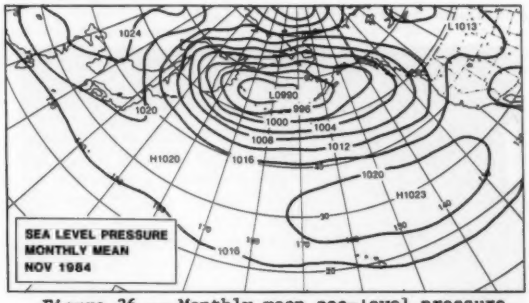


Figure 36.-- Monthly mean sea-level pressure.

The major anomaly was minus 14 mb near 57°N, 170°E. There was another minus 7 mb center near 49°N, 130°W. The sea-level pressure over the ocean was below normal for the area north of latitude 40°N and south of latitude 70°N. The Pacific High produced several plus 4 mb centers north of Hawaii. The Arctic High resulted in a plus 9 mb center near 80°N, 180°.

In the upper air at 700 mb the flow was zonal between latitudes 30°N and 50°N. There was an anomalous LOW near 57°N, 180° with the height about 300 ft lower than normal. The HIGH over the subtropics was about 120 ft higher than normal. These differences increased the gradient considerably.

Typhoons Agnes, Bill and Clara formed this month.

Some Climatology. On November 07, 1940 the Galloping Gertie Bridge at Tacoma, Wash. collapsed in strong winds just @ months after opening.

Extratropical Cyclones--The month started with a large cyclone over the north ocean and three HIGHs approximately along latitude 30°N. At midweek another large cyclone was over the northwest ocean. By the end of the week only weak LOWs remained north of latitude 45°N. Normal HIGHs were over the subtropics. Typhoon Agnes formed this week.

The second week began with multiple weak systems but by midweek a strong LOW was

developing near Kamachatka and deepened to 948 mb. At end of the week this storm covered hundreds of miles while still centered off the east coast of Kamchatka. The cyclonic circulation reached as far south as latitude 35°N and east to longitude 155°W. Typhoon Bill came to life.

The large storm started breaking up into multiple centers the third week. Low pressure centers dominated the ocean north of latitude 35°N. At midweek one of the LOWs got a burst of energy near midocean to become another severe storm. This one was gone by the end of week and replaced by another. Typhoon Clara formed.

This last severe storm was weakening the first part of the fourth week and a large HIGH moved out of Asia. The Pacific High was also large and strong. The end of the week found two strong LOWs over the water with a third moving eastward from the Sea of Oshotsk. The last of the month this third LOW was the only significant cyclone over the water. Its pressure dropped to 960 mb. There were high pressure cells on three sides.

The first large severe storm was a continuation of one that formed in October. This storm came out of Asia on November 1. At 1800 on the 2d the KYUSHU MARU was in the warm sector with 48-kn south winds and 30-ft swells. By 1200 on the 3d the storm was 972 mb over the Kamchatka Peninsula. The YOUNG SOLDIER (48°N, 163°E) measured 48-kn southwest winds and 26-ft swells. On the 4th the EASTERN BRIDE (49°N, 161°E) measured 45-kn winds, 30-ft seas. The storm was near Nunivak Island on the 6th when it disappeared.

This storm came out of Manchuria and was over the Sea of Okhotsk on the 9th. The YOUNG SPLENDOR (46°N, 151°E) had 50-kn winds and 18-ft waves. At 0000 on the 11th the 972 mb storm was near 54°N, 165°E. The REGINA MAERSK (47°N, 158°E) had 55-kn winds from 240° and 26-ft seas. The PRESIDENT LINCOLN (51°N, 160°E) had 56-kn west winds and 15-ft waves. This was a very large storm on the 12th. The SAMUEL S. (44°N,171°E) measured 33-kn south winds, 10-ft seas, and 48-ft swells. The NEPTUNE PEARL (52°N, 169°E) had 39-ft swell. The TOYOTA MARU No. 15 (52°N, 171°E) measured 64-kn southwest winds. There were many reports near 50-kn and above over the next several days. From the 13th through the 15th the storm was stationary near 57°N, 167°E (fig. 37). On the 13th the central pressure was 948 mb and the TOKYO RAINBOW (53°N, 176°E) measured 73-kn southwest winds and 43 ft sea and swell. The GREEN MAYA (52°N, 171°E) measured 60-kn winds, 10-ft seas, and 46-ft swells. Another ship nearby reported 39 ft. The SAMUEL S (42°N, 166°E) reported 44-ft swells on the 14th. The TOKYO RAINBOW still had 43-ft swell. The SIDNEY FOSS (59°N, 151°W) had winds gusting to 65 kn and 24-ft swells.

On the 14th another center formed in the southeastern periphery of the storm and moved northward. This tended to weaken the storm. The SAMUEL S. still had 41-ft swells on the 15th with 55-kn winds. There were still many strong gale reports. The swells decreased to 33-ft on the 16th. This LOW was absorbed by another on the 17th.

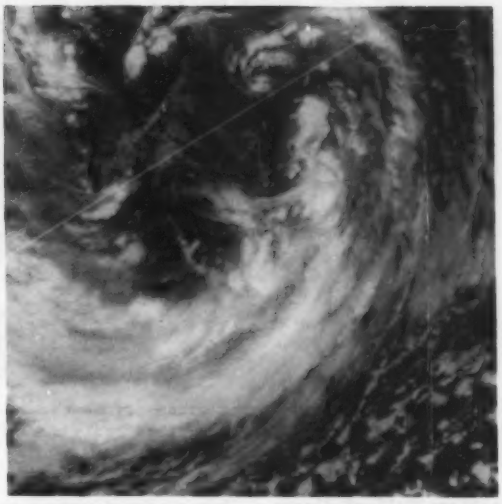


Figure 37.--Without gridding or landmarks positioning is difficult. Surface observations are essential.

This storm originated east of Honshu on the 15th. The storm was moving through the southern periphery of the storm above on the 16th. The PRESIDENT CLEVELAND (43°N, 170°E) had 45-kn northwest winds and 33-ft sea and swell. The DON JUAN (35°N, 164°E) measured 40-kn winds and 26-ft seas. At 0000 on the 17th the storm was 980 mb near 47°N, 178°W. The ORIENTAL EXECUTIVE (49°N, 179°W) measured 64-kn north winds. The SILVER SHINKO south of the center had 33-ft waves. The storm deepened again to 962 mb on the 18th. The ORIENTAL MINISTER (42°N, 171°W) had 45-kn winds, 20-ft seas, and 39-ft swells. The SEA-LAND ENDURANCE (48°N, 152°W) measured 46-kn west winds, 10-ft seas, and 43-ft swells. On the 19th and 20th only high swell reports remained.

Another LOW from out of Asia. This one was over the Sea of Okhotsk on the 17th. At 1200 on the 18th it was 976 mb near 50°N, 167°W. The winds were mostly gales but the PRECIOUS (46°N, 161°E) had 55-kn winds and 20-ft swells. The ORIENTAL EXECUTIVE (46°N, 166DE) measured 60-kn west winds, 12-ft seas, and 26-ft swells on the 19th, the KAMSHAK QUEEN and CAROLYN JEAN had 45 to 50-kn winds gusting to 60 kn. The winds were mostly gales on the 20th but there were some high waves. The DUEE (54°N, 175°W) had 35-ft swells. The QUEENS WAY BRIDGE (53°N, 176°W) measured 45-kn winds, 10-ft seas, and 33-ft swells. The TARPON (59°N, 140°W) reported winds of 60 kn, 20-ft seas, and 25-ft swells on the 21st. Fishing vessels in the Gulf of Alaska reported many high winds and waves on the 20th and 21st. Several reported winds gusting to 70 and 75 kn. Among them were the BULFIN, MARINE COMMANDERS, SIDNEY FOSS, SANDRA FOSS, TUSTUMENA, INDEPENDENCE, PORTLAND, and AMBER DAWN.

Figure 38.-- Hurricane-force winds struck the southeast community of Tenakee Springs badly damaging many buildings. WIDE WORLD PHOTO.

On the 22d another LOW moved into the eastern Gulf of Alaska. This produced more high winds and waves off the Alaska Coast (fig. 38). The GALVESTON REPORTED 60-kn southwest winds, 26-ft seas, and 23-ft swells new 54°N, 136°W. This LOW was gone in 24 hr. The significant weather remaining was waves over 25 ft.

A frontal wave formed on a developing cold front near the Kuril Islands on the 23d. The developing LOW moved east-southeastward and on the 25th combined with the extratropical continuation of typhoon Clara. The storm deepened rapidly after this. The PRESIDENT JEFFERSON (42°N, 170°W) had 48-kn north winds, 21-ft seas, and 25-ft swells. At 0000 on the 26th the storm was 948 mb near 45°N, 152°W. The PRESIDENT JEFFERSON now reported 39-ft seas. Buoy 46005 measured 52-kn southeast winds and 20-ft waves.

On the 27th the storm was 976 mb off the coast of Washington. There were many high wind and wave reports. The FUJISAN MARU (49°N, 133°W) measured 62-kn east winds. The GLACIER BAY had 55-kn winds, 15-ft seas, and 28-ft swells. The PRESIDENT MADISON and TYLER both reported 33-ft swells (fig. 39).

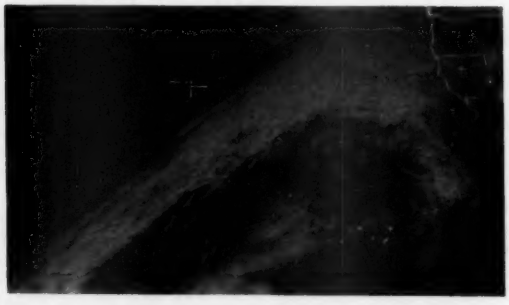


Figure 39.-- This storm also caused high winds along the West Coast from California to Washington. NOAA image.

Winds on the coast were very high. They gusted to 90 mi/hr at Cape Blanco, Oreg. and 80 mi/hr at Mt. Ashland, Oreg. They were measured as high as 58 mi/hr at San Francisco International Airport. The storm moved a shore at 0600 on the 28th over the Strait of Juan de Fuca and immediately broke up.

The RATNA KIRTI suffered a hole in her bow near the waterline in 50-kn winds and 20-ft waves off northern California on the 26th. She tried to enter San Francisco Bay but was unable to because of high winds.

This was another storm that came out of Asia. It was over the Sea of Okhotsk on the 24th. On the 26th it was reinforced by a frontal wave from the southwest. The KYOHO MARU (48°N, 165°E) measured 46-kn west winds, 13-ft seas, and 26-ft swells. At 0000 on the 27th the storm was 952 mb near 55°N, 178°E. The MIHO MARU (37°N, 163°W) was far southeast of the center and had 33-ft swells from the northwest. The BUNGA MELAWIS (47°N, 180°) measured 54-kn winds. The SUMMIT (52°N, 169°E) also had 33-ft swells. On the 29th the GREEN WOOD (51°N, 170°W) measured 45-kn winds and 41-ft seas and swells. The SEA-LAND ENDURANCE (51°N, 180°) measured 50-kn west winds and 30-ft swells. The storm was weakening on the 29th with only gales but there were still 25-to 30-ft waves.

The point of occlusion of a front out of a LOW over the Kuril Islands produced this LOW on the 27th. It moved northeastward around the east side of the original LOW which was stationary. By 1200 on the 29th this LOW had absorbed the circulation of the original and was a 960 mb storm near 53°N, 175°E. A ship almost in the center of the storm had barametric pressure of 962.7 mb with northeast winds. The LARKFIELD (51°N, 177°E) had 44-kn winds and 30-ft swells that continued into the 30th. The HO-YU (46°N, 180°) measured 48-kn west winds and 17-ft waves. The PRESIDENT MADISON sustained cargo and hull damage in heavy weather about 500 mi west of California on the 30th.

On December 1 this was still a large storm but the central pressure was rising. The SHIROMINE MARU (54°N, 164°W) measured 43-kn southwest winds, 10-ft seas, and 33-ft swells. On the 2d the ACCLIVITY PRINCE (41°N, 172°E) measured only 30-kn southwest winds, 8-ft seas, and 35-ft swells. The storm no longer existed on the 3d.

Casualties--The PUERTO RICAN broke in two and sank on the 3d off San Francisco in bad weather after she was towed out to sea because of an explosion.

These ships reported weather damage but could not be attributed to a specific storm: BIAK, BEAUFORT ISLAND, NICOLA JIL, ORIENTAL EXECUTIVE, PERTH, SEA ENCOURAGEMENT, and STONEPOOL.

The CAIRNSMORE contacted rocks in fog while approaching Queen Charlotte Island. The SANYO MARU and KAIUN MARA No. 3 collided in fog on the Inland Sea.

Other Casualties--The KANANGRA and NORTH HEAD collided at Sydney on the 5th during rainstorms. The NOMADA sent an SOS after reportedly being struck by lightning off Indonesia on the 7th. She sank and all crewmembers were rescued by the AUSTRALIAN HIGHWAY.

WEATHER LOG, DECEMBER 1984-- The majority of the cyclone tracks were over the western half of the ocean this month. The tracks were generally spread out over that half of the ocean but there were two paths that were more concentrated. One was from about 300 mi east of Tokyo northeastward to east of Kamchatka to the northern Bering Sea. The other was from near 37°N, 170°E northeastward to 55°N, 170°W. There were two storm tracks off the Washington Coast and four off the California coast. A few storms from the central ocean continued into Alaska.

Normally the Aleutian Low has two centers, one near the Rat Islands and the other near 54°N, 145°W at 1001 mb. This month there was a single 998 mb LOW near 57°N, 170°E (fig. 40). A sharp trough stretched east - southeastward to Vancouver Island. The Pacific High was 1024 mb at 35°N, 141°W, 4 mb higher than normal and 600 mi northwest of its normal position. A 1017 mb HIGH center was at 30°N, 170°E. A ridge of high pressure stretched from the Great Basin to the Yukon to the North Pole. The Asia High was 1046 mb (45°N, 90°E) stretched from Switzerland to Japan.

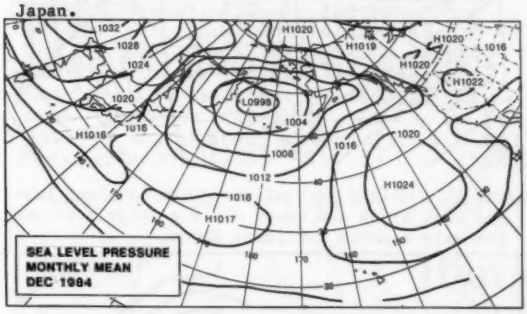


Figure 40.-- Monthly mean sea-level pressure.

The anomaly chart showed higher than normal pressure over most of the eastern half of the ocean north of latitude 25°N with a plus 11 mb center at 50°N, 150°W. An exception was asmall minus 4 mb center on the central California coast. The only major negative center was minus 8 mb near 62°N, 165°E.

At 700 mb the major circulation center was over northern Siberia near 70°N, 120°E instead of the normal one over the Sea of Okhotsk. The flow over the eastern longitudes was zonal with a ridge over the western longitudes.

Typhoon Doyle occurred this month.

Some Climatology: Very cold weather prevailed along the U.S. West Coast on the 11th in 1932. Nearly an inch of sknow fell at San Francisco and the temperature dipped to 22°F at the airport.

Extratropical Cyclones -- The month started with a large LOW centered over the Aleutian Islands. By midweek there were two strong LOWS, one midocean, the other over the Gulf of Alaska. HIGHS were over Japan, the central subtropics and the Pacific High. At the end of the week a large 1038 mb HIGH was near 38°N, 170°W. A LOW was off the California coast and another over the Bering Sea.

The second week the Bering Sea LOW intensified. The HIGH was building and moving eastward. Another HIGH moved over Japan and a frontal wave formed between the two HIGHS. This Low was severe by midweek and over Adak. Another HIGH was over Japan at the end of the week and all drifted eastward. Extratropical Doyle was a severe storm east of the Kurile Islands.

The HIGHs were breaking down the third week but the one over the central ocean persisted and tracked northeastward. The severe LOW was over the Bering Sea. Another LOW formed south of the persistent HIGH. A strong HIGH was over the Yukon. At midweek a 1044 mb HIGH was at 50°N, 145°W. A strong-small LOW was east of the Tsugaru Strait. At the end of the week another strong LOW was east of Kamchatka. The HIGH over the eastern ocean was breaking down.

The fourth week started with a large HIGH over the central ocean and many other small and weak centers. By midweek these were consolidating. Basically high pressure was east of 160°W. There were several low pressure centers west of 160°W. The end of the week found many LOW centers again with one off the California coast. The Pacific High was north of its normal location and moving southward. At the end of the month there was a large cyclonic circulation over the Fox Islands with several other centers imbedded. High pressure moved south out of the Yukon and was centered over British Columbia at 1054 mb.

This was a double center LOW over most of its life. One LOW moved over the Sea of Japan from Manchuria and the other formed south of Tokyo. On the 2d they joined forces but retained separated centers. Some gales were already being reported. On the 3d there were several reports of winds near 50 kn. The JINYO MARU (36°N, 145°E) reported 62-kn north winds and 20-ft swells. At 0000 on the 4th the storm was 976 mb near 44°N, 179°E and 978 mb near 42°N, 172°E. Winds near 50 kn and waves up to 25 ft were found. On the 5th most of the high winds were in the northerly flow with the western center. The VERRAZANO BRIDGE (34°, 177°E) had 45-kn winds, 23-ft seas, and 30-ft swells. The AURORA ACE (50°N, 157°W) measured 65-kn winds northeast of the eastern center. By the end of the day both centers were gone.

This storm formed in the col area between the Pacific High and another HIGH on the 2d. By 0000 on the 3d it was 972 mb near 45°N, 157°W by 1200 the pressure was 960 mb. The STAR HONGKONG (48°N, 155°W) measured 54-kn measured 54-kn east winds and 17-ft waves. The HANJIN POHANG (52°N, 152°W) had 33-ft swells. On the 4th the CHEVRON COLORADO (58°N, 144°W) had only 33-kn southeast winds but the swell was 26 ft. On the 5th there were three centers in the cyclonic circulation.

The MOBIL MERIDIAN (58°N, 142°W) had 41-ft swells from the southeast. By the 6th the storm was back to one 972 mb center at 57°N, 145°W. The swell had decreased to 25-ft for the MOBIL MERIDIAN. The KAMSHAK WUEEN reported northwest 56-kn winds gusting to 61 kn and 30-ft swell. The storm dissipated on the 7th.

A series of stable frontal waves were over Japan early on the 5th. By 1200 one of these had become unstable and started to deepen. By 1200 on the 6th it was 972 mb south of Ostrov Beringa. The PACIFIC VICTORY (40°N, 153°E) measured 31-kn south winds, 20-ft seas, and 30-ft swells. On the 7th the HANJIN POHANG (53°N, 174°E) measured 58-kn winds, 20-ft seas, and 30-ft swells. A USSR ship nearby measured 56 kn. The LIONS GATE BRIDGE (54°, 157°W) found 36-ft swells. At 0000 on the 8th the storm was 964 mb near 62°N, 173°W. There were a lot of strong gale to storm force wind and waves over 25 ft reports. The PRESIDENT WASHINGTON (53°N, 180°) measured 45-kn winds from the west, 17-ft seas, and 26-ft swells. St. Paul Island measured 45 mi/hr winds on the 9th. The storm was weakening over the south coast of Alaska but the EASTERN VENTURE (54°N, 153°W) had 45-kn winds and 26-ft seas and swells. The Coastal Mountains defeated the storm by the 10th.

Another col area storm. It formed between a large 1042 mb Pacific High and high pressure over Japan on the 7th. At 0000 on the 9th it was 986 mb near 43°N, 176°E. There were storm-force winds and waves over 25 ft in all quadrants. The NEPTUNE ALTAIR (45°N, 177°E) measured 56-kn south winds, 17-ft seas, and 26-ft swells. The GEMINI (47°N, 175°W) also measured 48-kn winds and 30-ft swells. At 0000 on the 10th the storm was 960 mb near 49°N, 176°W, fall in pressure of over 1 mb per hr. There were now many winds over 50 kn reported. The SEALAND DEVELOPER didn't have the high winds at 43°N, 173°W, only 36 kn, but did have 20-ft seas and 36-ft swells. The NEPTUNE PAVO (45°N, 151°) measured 66-kn west winds, 15-ft seas, and 25-ft swells. St. Paul Island had 46 mi/hr northeast winds. The storm moved across the Alaska Peninsula into the Gulf of Alaska on the 11th. There were not as many high wind reports on the 11th. The SANKO ETERNITY (53°N, 158°W) measured 55-kn winds and 31-ft swells. The CHEVRON MISSISSPPI reported 50-kn winds and 20-ft swells to WBH 29 Kodiak. The winds were slowly decreasing on the 12th as the storm moved ashore. The KASUGAI MARU (53°N, 149°W) measured 46-kn winds and 49-ft swells. Most of reports included 10- to 15-ft seas and 25 to 30-ft swells. By the 13th the LOW was lost in the mountains.

This severe storm was the extratropical conversion of typhoon Doyle. The storm had absorbed a frontal system and was extratropical by 1200 on December 11. The winds were light on the 12th but a ship near the front had heavy rain and 30-ft swells. The storm was moving northeastward and was 980 mb at 0000 on the 13th east of Hokkaido. There were a lot of storm-force winds and waves over 20 ft this day. One of the higher wind reports was 56 kn by the CRYSTAL STAR at 36°N, 169°E. The SHELDON LYKES (38°N, 162°E) had 50-kn winds, 25-ft seas and 33-ft swells.

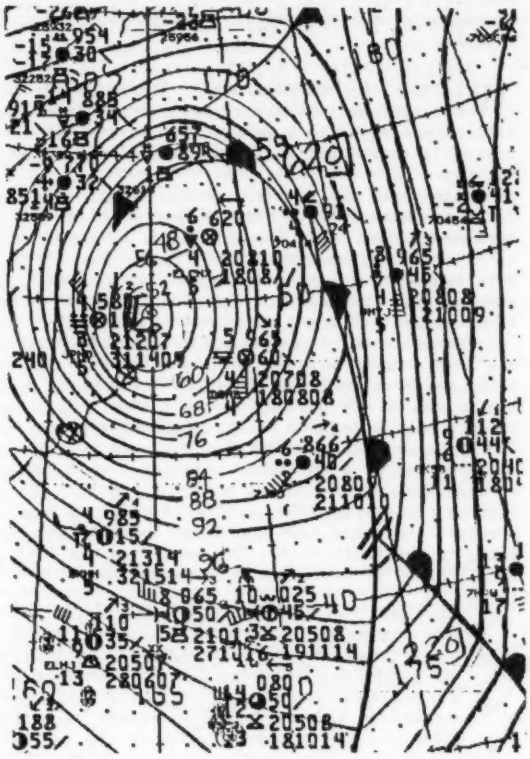


Figure 41.--Only a part of the storm is shown here. The high winds and waves cover a large area and probably reached hurricane force.

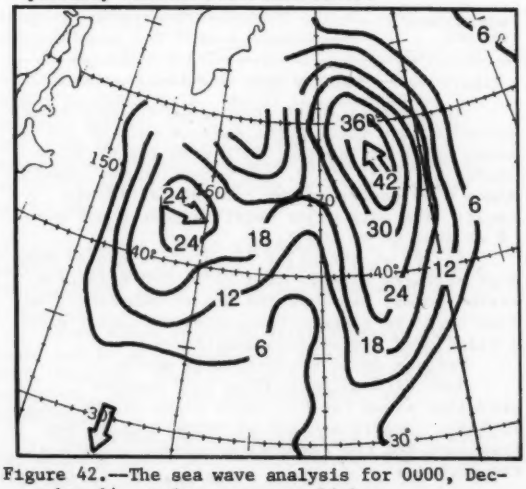


Figure 42.--The sea wave analysis for 0000, December 14. Swells were even higher.

At 0000 on the 14th the storm was 948 mb near 50°N, 166°E, almost as deep as Doyle's

minimum sea-level pressure of 935 mb as a typhoon and much larger in area (figs. 41 and 42). The ALPINE ROSE (53°N, 171°E) had 60-kn east wind, 13-ft seas, and 44-ft swells. A Japanese ship reported a pressure of 958 mb. The GREEN STAR south of the center measured 58-kn west winds, 30-ft seas, and 36-ft swells up to 1,000 mi south of the center. At 1200 on the 14th the central pressure was 934 mb. Ostrov Beringa measured a pressure of 943 mb at that time and it must have been lower as the storm passed nearer the island at 0900. Later in the day another LOW formed in the southern part of the storm. The cyclonic circulation extended from 70°N to 30°N and the Asian Coast to the Alaska Coast. It appeared on the chart that Little Diomede Island reported 50 -kn east winds and heavy snow. In general the higher winds were decreasing on the 15th. The OCEAN FRIEND (48°N, 165°E) measured 47-kn winds and 39-ft seas and swells. The SKEENA (57°N, 180°) had 50-kn southwest winds, 30-ft seas, and 49-ft swells. The pressure was still 945 mb. On the 16th the storm was over the Arctic Ocean and rapidly breaking up.

The East China Sea produced this storm on the 16th. It raced eastward and started deepening on the 17th. At 0000 on the 18th it was a small 968 mb storm at 41°N, 61°E. The SEA-LAND ENDURANCE (42°N, 165°E) measured 60-kn southeast winds and 20-ft seas. The KOREAN WONIS ONE (42°N, 158°E) measured 69-kn north winds but only reported 13-ft waves. On the 19th the BUNGA MELAWIS (45°N, 169°E) was very near the center of the storm with 50-kn winds, 30-ft seas, and 49-ft swells. She reported weather damage on arrival in Japan. By the 20th this storm was absorbed by another approaching from the southeast.

This was that storm. It formed off northern Honshu on the 18th. It rapidly intensified over the Kuroshio Current. On the 19th the PRESIDENT PIERCE (35°N, 143°E) had 64-kn winds and 20-ft waves. The TOYOTA MARU (38°N, 154°E) measured 50-kn west winds, 25-ft seas and 26-ft swells. At 0000 on the 20th the storm was 960 mb near 49°N, 164°E. The PACEMPEROR 38°N, 168°E measured only 15-kn winds but found 31-ft swells. The GREEN WOOD (46°N), (168°E) measured 55-kn winds from the southwest and 23-ft seas. The HANJIN INCHEON (53°N, 178°E) measured 51-kn winds and 33-ft seas and swells on the 21st. The RIMBA SEPETIR (47°N, 161°E) had 50-kn winds. The storm had weakened considerably by the 22d over the Bering Sea but it managed to survive the trip across Alaska and the Rocky Mountain until over Montana on the 27th.

The North Pacific was relatively quiet the remainder of the month. There were isolated reports of high winds and/or waves but there was no well organized severe storm.

Casualties --The ABBEY reported heavy weather damage on arrival in Japan on the 27th from Vancouver. The ATTIKA HOPE diverted to Honolulu after a cargo of steel pipes shifted in heavy weather. The BLUE ANGEL sent distress calls after developing a 40° list in heavy weather off Taiwan and sank. The EVER PROMOTER picked up 14 crew members and the CENTRAL MINDANAO rescued 3. Three were lost. The BUNGA MELAWIS reported weather damage at Shimizu. The GOLDEN PINE had a log cargo shift off Okinawa on the 23d, took on water and sank. All 25 of the crew were rescued by the Maritime Safety Agency. the OWARI MARU and a barge collided in high winds at Okinawa on the 2d.
Other Casualties — The IBN BAJJAH reported heavy weather damage on the 26th on arrival at Dubai. The IONIO grounded at Jeddah on the 31st in heavy weather.

Hurricane Alley

Dick Deangelis
National Oceanographic Data Center
Washington, DC

The tropical cyclone tracks (fig. 43) and the summaries are based upon information provided by the Naval Environmental Prediction Research Facility, the National Hurricane Center, the Eastern North Pacific Hurricane Center, the Joint Typhoon Warning Center and the Synoptic Analysis Branch of the National Environmental Satellite, Data and Information Service. A special thanks goes to Ted Tsui and Emil Gunther. Table 6 lists the tropical cyclones that have developed so far in 1985. Details on the North Atlantic hurricanes can be found in the annual article in the last issue while the eastern North Pacific storms are summarized on page 63 of this issue.

TROPICAL CYCLONES--OCTOBER 1984

Twelve tropical cyclones developed across the Northern Hemisphere from the western North Atlantic westward to the Bay of Bengal. Seven of these reached hurricane intensity. This activity was above the average of nine tropical cyclones of which five reach hurricane strength. The bulk of the action was in the western North Pacific where shipping had a rough month.

Little was heard from Ogden and Phyllis, althhugh both reached typhoon strength but remained east of 150°E. However the PRESIDENT WILSON and PRESIDENT HOOVER did encounter 24-to 26-ft swells on the 13th and 14th to the east of Phyllis. Vanessa was the real powerhouse. Late on the 25th she reached super typhoon strength and her winds remained at or above 130 kn until the 28th. Maximum winds near her center reached 155 kn on the 26th. She was the first super typhoon of the season. On the 26th and 27th the OCEANIA MARU was sailing close to the storm. At 0800 on the 27th, about 60 mi northeast of the center, she encountered southeast winds of 80 kn in 30-ft seas. On the 29th some 180 mi south of

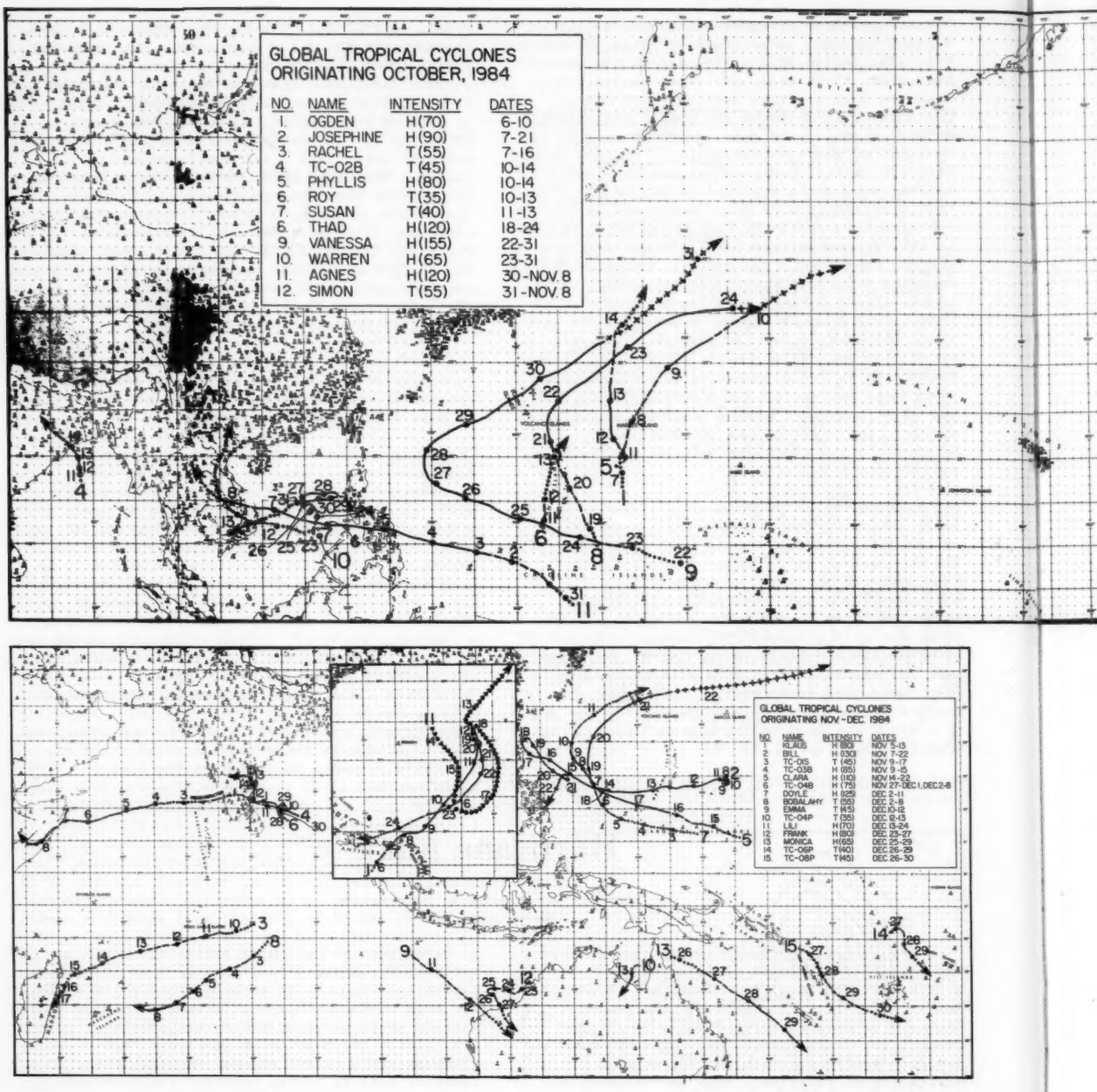
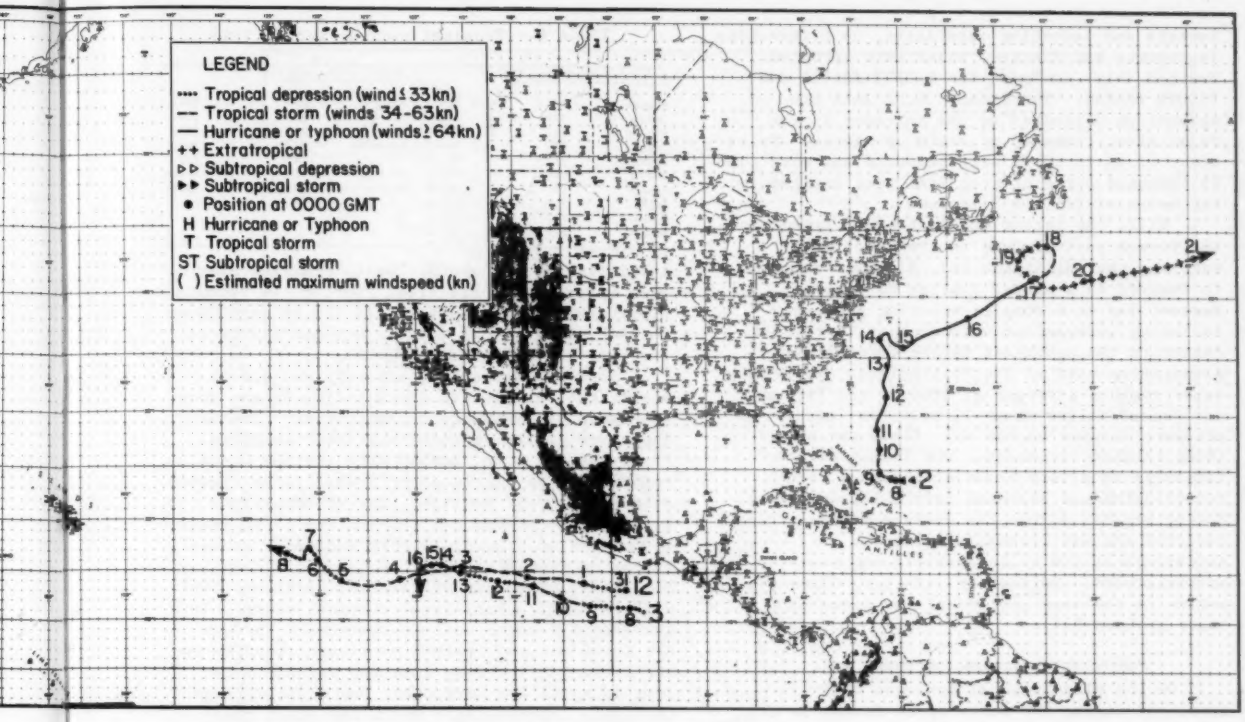

GLOBAL TROPICAL CYCLONES
ORIGINATING OCTOBER, 1984
NO. NAME INTENSITY DATES
1. OGDEN H(70) 6-10
2. JOSEPHINE H(90) 7-21
3. RACHEL T(55) 7-16
4. TC-02B T(45) 10-14
5. PHYLLIS H(80) 10-14
6. ROY T(35) 10-13
7. SUSAN T(40) 11-13
8. THAD H(120) 18-24
9. VANESSA H(155) 22-31
10. WARREN H(65) 23-31
11. AGNES H(120) 30-NOV.8
12. SIMON T(55) 31-NOV.8
GLOBAL TROPICAL CYCLONES
ORIGINATING NOV-DEC. 1984
NO. NAME INTENSITY DATES
1 KLAUS H (80) NOV 5-13
2 BILL H (130) NOV 7-22
3 TC-01S T (45) NOV 9-17
4 TC-03B H (85) NOV 9-15
5 CLARA H (110) NOV 14-22
6 TC-04B H (75) NOV 27-DEC 1, DEC 2-8
7 DOYLE H (125) DEC 2-11
8 BOBALAHY T (55) DEC 2-8
9 EMMA T (45) DEC 10-12
10 TC-04P T (35) DEC 12-13
11 LILI H (70) DEC 13-24
12 FRANK H (80) DEC 23-27
13 MONICA H (65) DEC 25-29
14 TC-06P T (40) DEC 26-29
15 TC-08P T (45) DEC 26-30

Figure 43.— Tracks of tropical cyclones for October, November, and December, 1984.

the center the seas were 17 ft with 30-ft swells.

Vanessa came close to equalling the records set by super typhoon Tip in 1979. Her pressure dropped 100 mb in a 48-hr period to reach a minimum of 879 mb at 1114 on the 26th; just 9 mb higher than the 870 mb recorded in Tip. The estimated 155-kn sustained wind is 10 kn below Tip's record. Fortunately for the Philippines, Vanessa followed a climatological pattern by recurving near 130°E.

While Vanessa was intensifying among the Caroline Is., typhoon Warren was coming to life in the South China Sea. He moved east-


LEGEND
···· Tropical depression (wind ≤ 33 kn)
— — Tropical storm (winds 34-63 kn)
— Hurricane or typhoon (winds ≥ 64 kn)
++ Extratropical
▷▷ Subtropical depression
▶▶ Subtropical storm
• Position at 0000 GMT
H Hurricane or Typhoon
T Tropical storm
ST Subtropical storm
( ) Estimated maximum windspeed (kn)

northeastward under the influence of Vanessa. Enhanced by the southwest monsoon, Warren's winds reached typhoon strength. Warren first turned a counterclockwise loop, then headed eastward for Luzon before moving west-southwestward toward Vietnam. On Luzon heavy rains caused landslides in several coastal towns, resulting in at least 42 deaths. Rough seas capsized and sank the inter-island passenger ferry VENUS (746 tons) on the 28th off Torrijos and the Bondoc Peninsula. About 36 people died but at least 213 passengers were saved. In addition the LORENZO CONTAINER VIII was sunk on the 28th off Fuego Pt., Batangas; eight crew members were listed as missing. Also a Philippine ship sank near Marinduque Is. Two navy ships rescued 98 people but 126 were listed as missing.

Just before the month ended typhoon Agnes came to life south of the Caroline Is. On November 4 before reaching the Philippines, she was generating 120-kn winds. Agnes moved rapidly across the central Philippines and, although weakening, she managed to maintain typhoon intensity. This was testified to by the EXPLORA which recorded 72-kn winds on the 5th, within a few miles of the storm center. Agnes created havoc both at sea and on land. A ferry sailing to shore, to escape the typhoon, sank drowning an estimated 564 people, including 38 children. Grounded ships in the Philippine region included the SEVEN LOG MASTER, DONA JOSEFINA, DONDOMINADOR I, IMA, PKS 747, SOLID XV, EMPRISE I and the MUSKRAT. The cruise vessel REGENCY grounded after being dashed against a pier at Buyallao Is. Agnes made landfall in the same area where Ike was responsible for one thousand deaths in early September (fig. 44). The death toll from Agnes stands at 564 known dead and combined with people reported missing the final count will be near one thousand. When the typhoon made land fall over Vietnam 3 days later there was more property and crop damage along with some loss of life.

TROPICAL CYCLONES--NOVEMBER 1984

Five of the six tropical cyclones that developed in November reached hurricane intensity. (The average is 6.5 and 3.1 respectively). This activity included an uncommon North Atlantic hurricane, two typhoons and two North Indian hurricanes; one tropical storm formed in the South Indian Ocean.

The North Indian hurricane known as TC-03B developed into the most intense storm of the season in this basin. It was responsible for at least 430 deaths and has been called the worst storm to affect the central east coat of India in 15 yr. Moving northward on the 12th the storm deepened rapidly, attaining a peak intensity of 85 kn at 1800 on the 12th. An erratic path and the intensification of 03B occurred very close to the east coast and brought a prolonged period of heavy rain and flooding to the region. Over 20 thousand people were stranded in coastal villages due to the flooding. At India's space center, for testing

rockets and launching satellites, on Sriharikota Is. towers and electric poles were uprooted. Damaged ships included the VISHVA ADITYA and VISHVA ANURAG. The tanker MAJU JAYA can aground on a sandbar at the entrance to the Palar River, some 40 mi south of Madras. Storm tides of up to 10 ft were reported and more than 85 thousand acres of crop land were damaged in the heart of India's "ricebowl".

Bill, the second and last supre typhoon of the formed east of Guam on the 8th. After entering the Philippine Sea, Bill was expected to recurve in a manner similar to Vanessa. However due to a complex steering pattern, including interaction with typhoon Clara, Bill turned to the southeast before eventually dissipating east of the Philippines. He reached super typhoon strength at 1800 on the 14th and maintained it for about 12 hr. His lowest pressure dropped to 909 mb. Clara was one of those textbook typhoons. She formed at low latitudes as a very broad disturbance then consolidated and deepened into a 110-kn system. Moving rapidly across the western Pacific, Clara recurred and was transformed into an extratropical LOW while accelerating east-northeastward. During her lifetime, Clara was active in the same portion of the ocean as super typhoon Bill.

TROPICAL CYCLONES--DECEMBER 1984

Of the nine tropical cyclones that developed during the month seven formed in the Southern Hemisphere. A rare hurricane came to life in the North Atlantic as did a North Pacific typhoon. On the average, globally, there are six tropical cyclones of which two reach hurricane intensity.

Typhoon Doyle was the last tropical cyclone of the season in the western North Pacific. The initial development of Doyle was assisted by a low level disturbance in the Coral Sea, east of Cape York, which increased the westerly low-level flow to his south. Doyle remained over open water all of his life. During the typhoon stage maximum winds climbed to 125 kn at 0000 on the 9th, about 27 hr after a minimum sea level pressure of 935 mb was reported.

Table 6.--Tropical cyclone watch, 1985

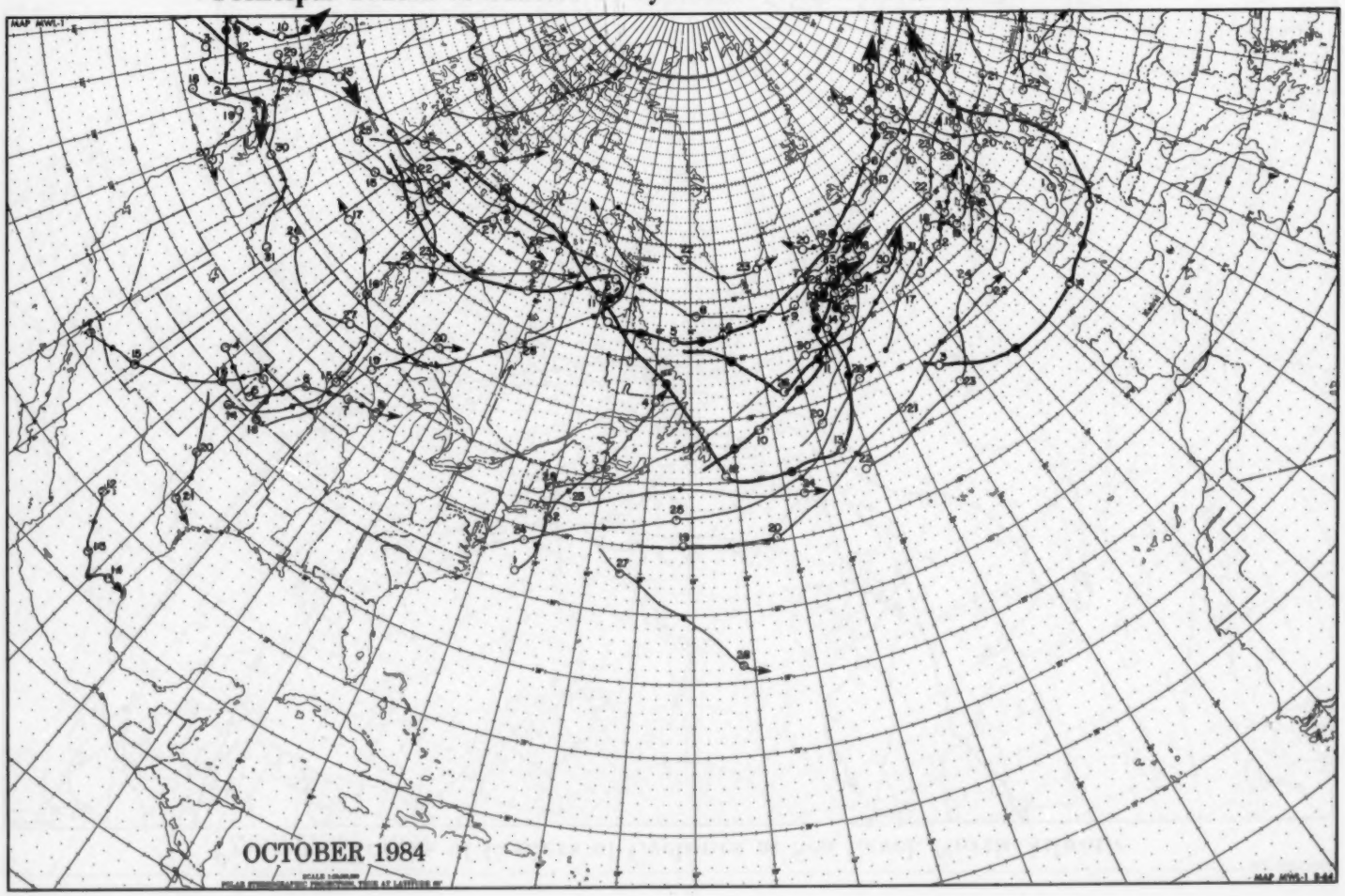
Australia-South Pacific				South Indian Ocean			
Hubert	20S	H	Feb.	Esitera	19S	T	Feb.
Jacob	25S	H	Feb.	Feliksa	21S	T	Feb.
Pierre	26S	T	Feb.	Isabel	22S	T	Feb.
Gavin	27P	T	March	Gerimena	23S	H	Feb.
Lindsay	29S	T	March		24S	T	Feb.
Hina	30P	H	March	Kristy	28S	T	March
Sandy	31P	H	March	Helissaonina	33S	H	April
Tanya	32P	H	March				
Gretel	34P	T	April				
Margot	35S	H	April				

Southern Hemisphere activity was spread across the Pacific and South Indian Oceans from the Samoa Is. westward to Madagascar. Two of the seven storms attained hurricane strength. Frank was the most intense with maximum winds reaching 80 kn on the 25th; 2 days later removed ashore near Port Hedland. Two weeks earlier tropical storm Emma had crossed the coast about 150 mi west-southwest of Port Hedland. Storms formed on either side of the Cape York Peninsula. The Gulf of Carpentaria storm (04P) was a minimal, short-lived tropical storm. To the east 07P moved east-southeastward through the Coral Sea and reached hurricane strength on the 27th. At the same time 06P and 08P were developing to the northeast. One moved through the Samoa Islands (06P) while the other (08P) skirted the New Hebrides Islands. Early in the month tropical storm Bobalahy came to life in the South Indian Ocean. Maximum winds reached 55 kn but the storm dissipated before reaching the Mascarene Islands.

North Atlantic hurricane Lili was just the third hurricane since 1871 to form in December. The first known hurricane occurred in 1887. It wasn't until Alice developed in 1954 that another one was spotted.

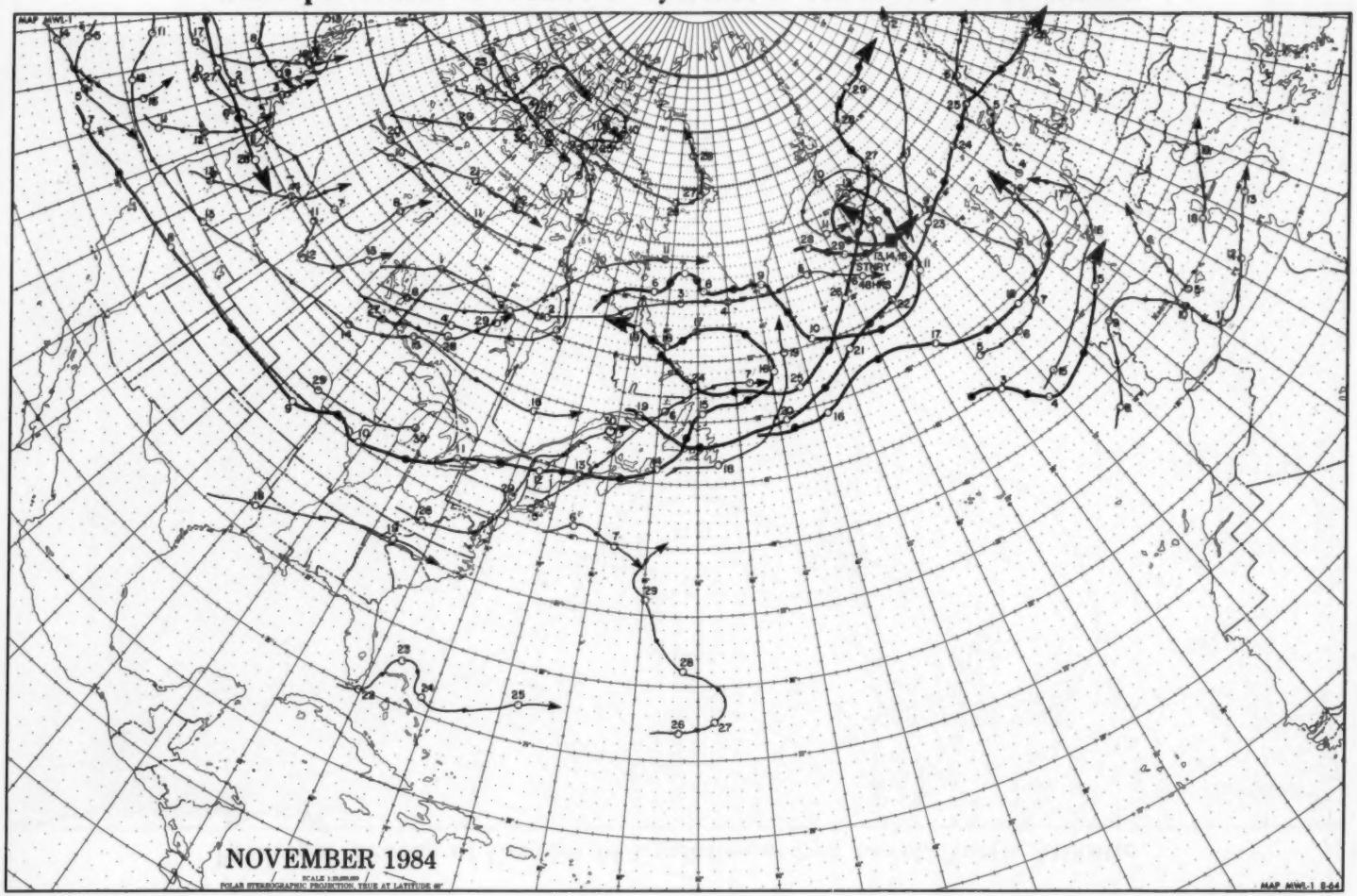
Figure 44.-- A typical scene throughout the central Philippines where Agnes cut a path of destruction.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

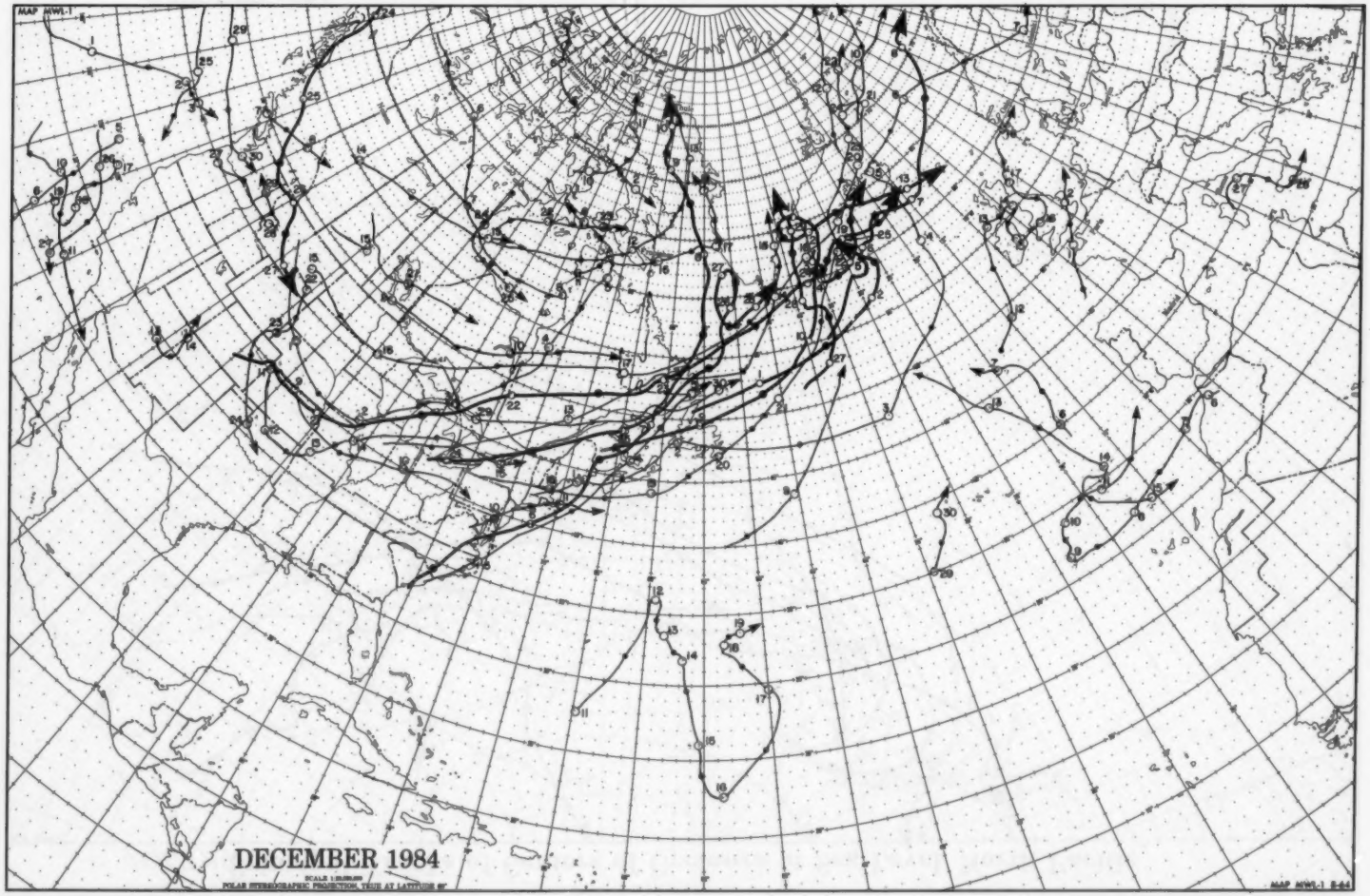
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

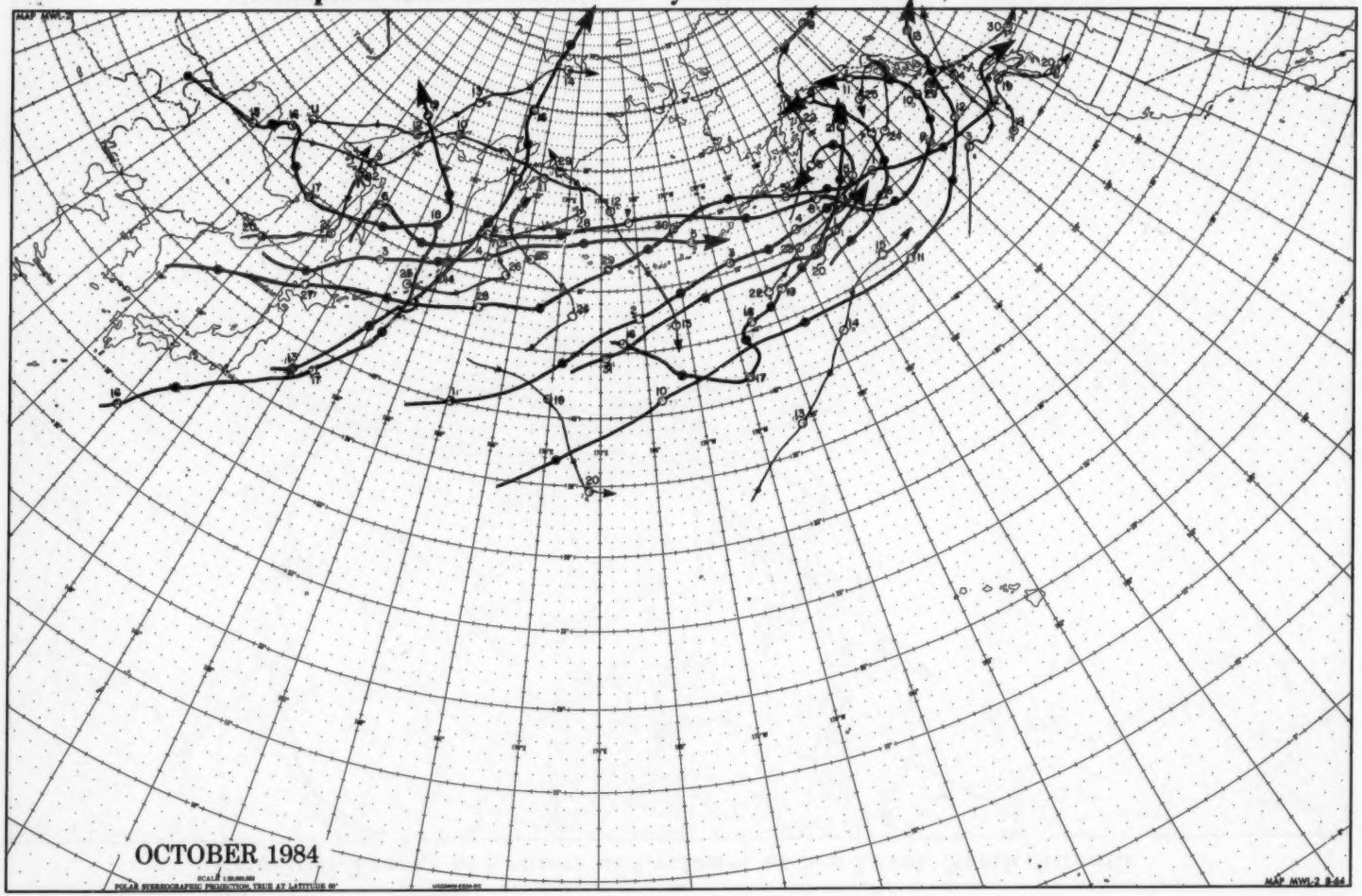
heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



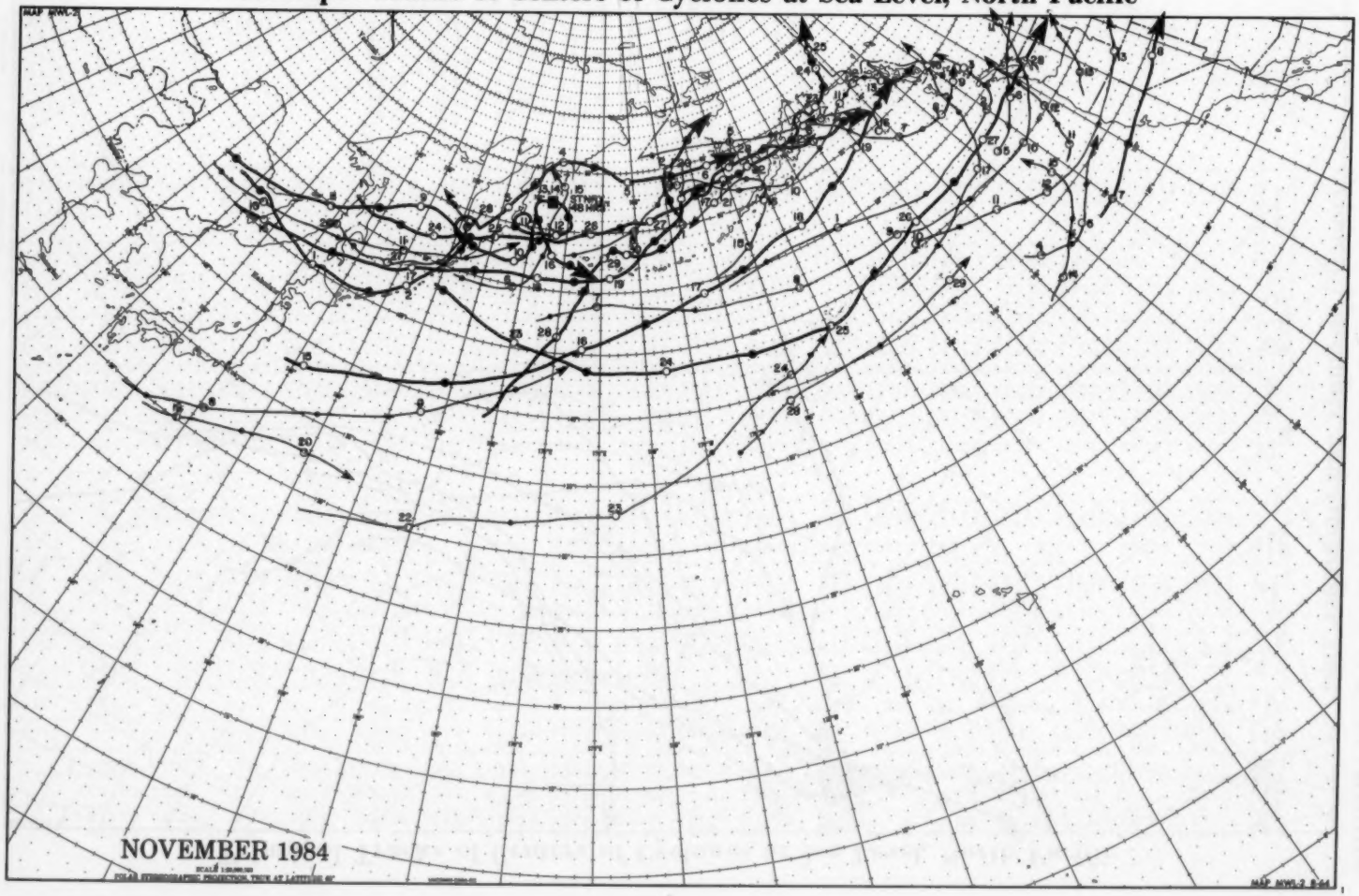
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



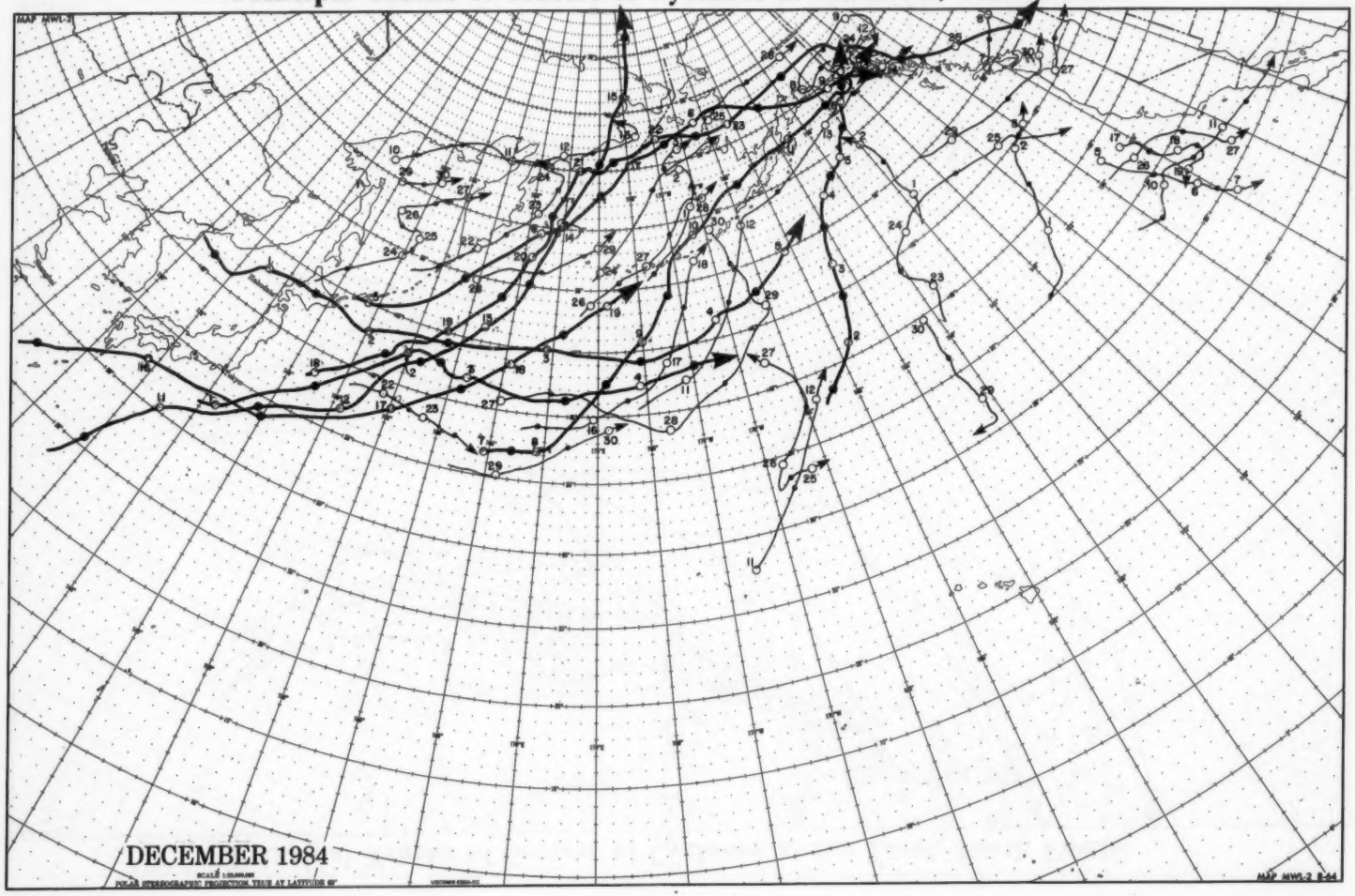
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations
October, November and December 1984

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10s	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10s	Swell Waves Period sec.*	Swell Waves Height ft.
	ATLANTIC	OCT.															
BAR' ZAH	ATZK	1	40.2 N	52.0 W	15	23	M 54	2 NM	16	1000.5	22.5	24.5	4	6.5	29	7	11.5
SEALAND PACER	KSLB	1	38.9 N	53.8 W	18	27	M 48	5 NM	70	1009.8		23.8	2	16.5	27	10	13
TFL FREEDOM	9VXX	4	46.5 N	15.3 W	18	33	M 46	2 NM	07	1012.0	16.0	17.5	7	14.5	33	10	29.5
	WNFB	6	57.7 N	37.8 W	12	25	M 45			1002.6	6.2		3	16.5	25	8	39
	WNDB	7	59.5 N	34.2 W	00	25	M 15			1002.0	6.2		2	10	25	9	24.5
ZEUS	PPFB	9	28.5 N	74.0 W	00	06	M 53	5 NM	03	1016.3	25.5	22.0	8	13	06	8	11.5
KENNETH E. HILL	C6FA7	9	27.0 N	70.3 W	18	12	M 54	1 NM	82	1001.8	25.0	26.5	10	14.5	XX	8	21
ZEUS	PPFB	10	27.8 N	71.4 W	06	10	M 44	< 50 YD	65	1001.3	25.0	21.0	8	16.5	08	8	16.5
MELBOURNE HIGHWAY	3EPW2	10	26.6 N	71.6 W	17	20	M 55	50 YD	05	1002.0	24.0	27.0	12	19.5	20	14	23
AMOCO BALTIMORE	5LRJ	11	29.2 N	69.5 W	12	14	M 60	.5 NM	46	1004.0	25.5	25.0	11	14.5	17	11	14.5
SEALAND LEADER	WSNN	12	41.7 N	38.4 W	06	22	M 40	5 NM	03	1016.2	20.0	20.0	6	14.5	22	11	24.5
FORTALEZA	WENW	13	35.1 N	73.8 W	00	36	45	2 NM	81	1006.1	23.3	21.1	7	23	12	12	32.5
DISCOVERER SEVEN SEAS	3ELE	13	37.9 N	73.6 W	18	03	M 53	2 NM	07	1002.5	19.4	20.0	10	13	12	10	13
ALBULA	HBDP	13	36.7 N	74.1 W	18	02	50	2 NM	51	1002.5	21.0		9	16.5	18	17	23
SEALAND LEADER	WSPH	13	41.8 N	42.3 W	18	31	M 42	10 NM	02	1004.5	15.0	20.0	7	11.5	31	12	24.5
LASH ATLANTICO	WEZU	13	33.5 N	70.1 W	23	20	50	5 NM	00	0998.9	21.1	22.7	7	19.5	24	10	13
ALBULA	HBDP	14	38.6 N	74.3 W	00	33	50	1 NM	52	0985.0	20.5		9	16.5	02	18	19.5
SEALAND INDEPENDENCE	WSJC	14	48.2 N	36.5 W	00	32	M 50			0988.0	10.0	15.0	4	8	32	5	14.5
PITTSBURGH	KORA	14	35.2 N	74.3 W	06	01	50			1003.6	16.9	17.2	8	11.5	01	8	13
	WBVZ	14	47.9 N	25.3 W	06	19	M 50	5 NM	29	0998.0	17.5	15.0					
DISCOVERER SEVEN SEAS	3ELE	14	37.9 N	73.6 W	12	01	M 47	1 NM	65	0999.9	15.6	20.0	8	24.5	01	10	26
SEALAND EXPRESS	KGJD	14	34.5 N	68.6 W	18	22	M 43	5 NM		0998.1	23.0	23.0	6	24.5	22	10	26
DAVID D. IRWIN	KPEA	14	35.7 N	75.0 W	18	34	37	5 NM	02	1007.1	17.0	16.7	8	29.5	36	10	29.5
LASH ATLANTICO	WEZU	14	35.4 N	72.4 W	18	30	65	1 NM	64	0990.5	20.0	22.8	8	42.5	34	10	42.5
SEALAND EXPRESS	KGJD	15	35.2 N	66.0 W	00	22	M 40	5 NM	01	0998.0	22.0	23.0	7	21	22	9	24.5
SEALAND LEADER	WSNH	16	40.6 N	65.2 W	06	03	M 38	10 NM	02	1002.2	17.5	20.0	7	11.5	03	12	24.5
CHASTINE MAERSK	OWCY	16	42.5 N	56.3 W	21	05	40	.5 NM	82	0995.0	15.0		12	32.5			
CHASTINE MAERSK	OWCY	17	42.1 N	56.9 W	03	03	40	.5 NM	64	0986.0	14.0		XX	32.5			
	3FFU2	17	41.2 N	44.5 W	19	24	27	5 NM	02	1008.5	23.0	19.3	3	16.5	25	12	24.5
SEALAND VOYAGER	KHPK	19	47.5 N	14.8 W	18	29	M 40	10 NM	00	1008.1	16.0	16.0	6	19.5	30	10	26
TFL FREEDOM	9VXX	22	47.2 N	17.3 W	12	30	M 27	5 NM	01	1014.0	15.0	16.5	6	14.5	29	9	24.5
SEALAND EXPRESS	KGJD	27	44.0 N	30.3 W	18	27	M 34	10 NM	60	1003.0	13.0	17.0	6	18	28	9	24.5
	WBVZ	27	46.1 N	36.4 W	18	27	M 54	2 NM	81	0997.5	9.0	12.5	10	13	27	18	29.5
	ATLANTIC	NOV.															
	WNCB	4	53.3 N	40.8 W	12	30	27	5 NM	03	1005.1	2.7		4	6.5	27	9	26
	WNFB	5	52.3 N	41.8 W	02	27	30	5 NM	87	1011.3	2.7		4	6.5	27	10	24.5
AMERICAN HERITAGE	KVFN	7	41.7 N	38.0 W	18	33	25	2 NM	15	1010.0	17.7	16.6	14	32.5	31	15	32.5
AMERICAN PURITAN	KREB	8	49.6 N	13.6 W	00	04	32	10 NM	25	0992.0	10.0	13.3	4	10	05	10	24.5
TILLIE LYKES	WDDP	8	36.6 N	16.6 W	00	31	M 45	10 NM	02	0994.9	16.1	18.9	7	11.5	31	12	24.5
EXPORT CHALLENGER	WLSG	10	32.9 N	62.2 W	12	01	35	10 NM	01	1014.0	18.9	24.4	8	11.5	01	15	24.5
WALTER RICE	KCSE	12	46.3 N	21.9 W	00	31	30	10 NM	01	1017.0	11.1	13.9	5	6.5	31	16	24.5
USNS WACCAMAW(TAO-109)	NHNF	14	32.9 N	65.3 W	15	28	M 28	5 NM	07	1014.5	18.8	23.3	6	8	28	6	20.5
USNS WACCAMAW(TAO-109)	NHNF	15	32.9 N	65.6 W	00	29	M 35	5 NM	07	1016.0	18.2	22.8	6	13	28	10	24.5
	NADH	15	31.9 N	69.1 W	06	33	M 25	10 NM	03	1012.8	18.9	21.7	3	6.5	31	10	24.5
TFL FREEDOM	9VXX	16	40.8 N	58.4 W	12	30	M 30	5 NM	02	1016.5	14.0	22.0	6	13	30	10	24.5
USNS SEALIFT ARABIAN SEA	NFKG	16	34.0 N	40.1 W	18	36	30	10 NM	03	1016.0	22.2	25.0	2	5	31	15	24.5
TFL EXPRESS	9VPU	17	50.8 N	33.6 W	12	30	52	5 NM	01	0993.5	7.5	12.8	6	6.5	27	8	13
TFL FREEDOM	9VXX	17	41.5 N	41.1 W	12	23	M 33	10 NM	25	1014.8	19.0	20.0	6	11.5	23	6	24.5
AMERICAN PURITAN	KRCB	17	41.4 N	24.2 W	12	25	40	10 NM	25	1005.7	16.1	15.0	6	10	27	14	29.5
	ELDU8	17	44.7 N	23.6 W	18	27	M 60	2 NM	27	1003.0	11.0	11.0	6	16.5	27	6	16.5
	ELDU8	18	44.6 N	24.3 W	00	27	M 60	2 NM	27	1006.0	11.0	12.0	8	16.5	27	8	16.5
AMERICAN PURITAN	KRGB	18	40.6 N	26.2 W	00	26	34	10 NM	02	1015.0	17.2	15.6	6	11.5	27	10	24.5
AMERICAN PURITAN	KRGB	19	35.2 N	39.5 W	12	27	30	10 NM	03	1015.8	21.7	21.1	4	8	27	10	24.5
SEALAND PRODUCER	WJRJ	20	44.2 N	18.5 W	12	21	58	2 NM	50	0993.3	15.6	12.2	7	14.5	20	11	19.5
SEALAND VOYAGER	KHPK	21	46.1 N	34.0 W	18	27	M 40	10 NM	00	0990.0	10.0	15.0	6	10	27	10	24.5
SEALAND VOYAGER	KHPK	22	46.1 N	31.3 W	00	27	40	10 NM	00	0988.4	10.7	15.0	6	10	27	10	24.5
TFL LIBERTY	9VTD	22	44.8 N	11.0 W	09	24	M 50	2 NM	62	1002.3	17.0	14.5	7	11.5	24	6	29.5
SEALAND PRODUCER	WJRJ	22	48.6 N	12.7 W	18	26	52	5 NM	81	0987.1	12.2	11.1	5	16.5	25	10	23
OVERSEAS NEW YORK	WMCK	22	24.0 N	48.0 W	18	01	50	5 NM	02	1021.2	26.7	26.7	4	13	01	10	19.5
KENNETH E. HILL	C6FA6	23	32.1 N	77.9 W	06	06	M 49	10 NM	00	1019.0	20.5						
SEALAND CONSUMER	WCHF	23	49.5 N	04.9 W	06	25	50	5 NM	02	0995.0	13.9	13.3	6	11.5	23	10	31
AMERICAN HERITAGE	KVFN	23	49.7 N	14.5 W	12	18	28	5 NM		0992.5	9.4	10.9	15	14.5	14	15	28
SEALAND CONSUMER	WCHF	24	48.5 N	06.6 W	00	27	45			1000.0	14.0	12.7	6	16.5	27	8	41
EXPORT CHALLENGER	WLSG	25	37.6 N	44.9 W	12	21	50	.5 NM	44	0996.5	14.4	21.7	5	6.5	21	7	19.5
AMERICAN HERITAGE	S6DY	26	48.2 N	17.3 W	18	19	M 50	5 NM	00	1007.0	15.0	15.0	8	16.5	21	14	23
	KVFN	27	37.4 N	32.1 W	00	36	10	10 NM	01	1023.0	17.2	17.0	5	16.5	20	15	24.5
	S6DY	27	47.9 N	19.0 W	00	19	M 50	5 NM	00	1000.0	15.0	15.0	8	16.5	21	14	23
SEALAND PRODUCER	WJRJ	29	41.7 N	27.9 W	12	31	50	5 NM	21	1007.7	13.3	13.3	5	16.5	27	8	26
SEALAND ADVENTURER	KSLJ	30	36.7 N	23.1 W	18	31	M 28	10 NM	25	1014.5	18.0	18.0	5	13	32	10	28
	ATLANTIC	DEC.															
CHESNUT HILL	WVFX	2	56.5 N	28.1 W	18	31	M 55	5 NM		0966.0	8.5	8.9	3	6.5	26	10	11.5
CHESNUT HILL	WVFX	3	56.1 N	29.1 W	00	27	M 48	2 NM	60	0994.0	9.4	8.9	3	10	27	10	21
CHESNUT HILL	WVFX	4	53.9 N	35.3 W	18	29	M 52	5 NM		1000.4	1.0	6.1	3	13	26	10	24.5
CHESNUT HILL	WVFX	5	52.1 N	39.1 W	00	27	M 50	10 NM	01	1015.0	- 2.8	5.0	3	13	26	10	21
OGDEN DYNACHEM	KNJK	7	16.0 N	95.3 W	06	01	65	5 NM	00	1017.1	23.3	26.1	2	13	01	0	13
AMERICANA	IBPA	7	40.3 N	59.5 W	18	28	50			1008.0	16.0	18.0	6	19.5			
ROVER	KRMS	7	47.5 N	18.5 W	18	04	20	5 NM	50	1011.2	10.5	12.0	4	1.5	04	18	29.5
CHESNUT HILL	WVFX	8	46.5 N	46.7 W	18	25	M 10	5 NM	02	1017.0	8.6	4.4	6	14.5	25	15	26
RAPID	KAAJ	13	43.1 N	25.7 W	18	01	60	5 NM		1016.0	12.3	16.2	8	24.5			
RAPID	KAAJ	14	43.3 N	26.5 W	00	36	40	10 NM	02	1016.0	12.2	15.5	6	12.5			
	WBJV	21	36.5 N	03.4 W	12	31	M 50	10 NM	00	1026.0	17.7	15.0					
TFL EXPRESS	9VPU	22	48.8 N	43.2 W	12	25	M 65	1 NM	23	1009.0	2.5	7.0	8	14.5	25	9	16.5
STAR KANDA	DUCA	23	13.0 N	69.8 W	12	06	M 20	5 NM	03	1007.5	25.5	26.0	3	8	35	30	41
STAR KANDA	DUCA	25	15.4 N	59.0 W	12	07	M 30	10 NM	03	1009.0	26.0	29.5	2	5	05	20	57
STAR KANDA	DUCA	26	18.1 N	54.9 W	12	06	M 33	10 NM	02	1012.0	26.0	30.0	4	8	06	30	57
AMERICAN PIONEER	WSPL	26	45.0 N	12.0 W	18	31	35	10 NM	02	1017.0	11.1	14.4	5	8	31	9	24.5
STAR KANDA	DUCA	27	19.4 N	52.5 W	00	07	M 30			1013.0	25.0	29.0	3	8	07	20	57
RIGOLETTO	5BWN	27	41.0 N	52.9 W	18	28	M 50	2 NM	88	1022.0		16.0	8	23	29	8	36
STAR KANDA	DUOA	28	23.6 N	44.7 W	12	06	M 28	10 NM	02	1017.0	21.5	26.0	2	5	06	20	37.5
AMERICANA	IBPA	28	40.0 N	35.9 W	18	31	22	5 NM	01	1019.0	15.0	17.0	10	8	30	12	24.5
	GR. LAKES	DEC.															
WOLVERINE	WZC4519	8	44.1 N	82.4 W	06	25	M 55	10 NM	02		- 1.0	8.0	9	11.5			
CITY OF MIDLAND	WD3866	11	44.1 N	86.4 W	23	30	M 48				4.0	6.0	XX	8			
CITY OF MIDLAND	WD3866	12	44.1 N	86.4 W	23	30	M 48	5 NM			3.0	6.0	XX	6.5			
H. LEE WHITE	WZC2965	17	45.3 N	86.2 W	00	24	M 48	10 NM	22		- 8.0	6.0	2	8			

+ Direction for sea waves same as wind direction
I Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

heavy line are described in the Weather Log.

North Pacific Selected Gale and Wave Observations

October, November and December 1984

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves			Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.°	Height ft.	
	PACIFIC	OCT.																
HANJIN INCHEON	3EUB	1	45.4 N	153.9 E	00	16	M 28	200 YD	52	1009.0	12.0	11.0	10	32.5	10	10	13	
SEALAND INNOVATOR	WGKF	1	53.7 N	149.5 W	06	23	M 45	5 NM	02	0987.1	11.0	11.0	10	21	23	10	24.5	
	KPIC	1	56.5 N	143.2 W	11	22	M 38	10 NM	00	0991.2	11.2	12.0	8	16.5	23	10	24.5	
GREAT LAND	WFDP	1	57.8 N	148.8 W	18	23	M 50	2 NM	18	0988.3	11.1	11.1	8	32.5	25	10	16.5	
HANJIN INCHEON	3EUB	2	42.2 N	144.5 E	00	25	M 16	1 NM	52	1012.0	14.0	14.0	8	24.5	10	8	16.5	
PHILADELPHIA	WJGO	2	54.9 N	138.3 W	00	22	M 18	10 NM	00	1012.0	13.9	13.9	7	24.5	26	10	26	
STAR LUZON	DZIA	3	33.3 N	140.1 E	00	14	55			1030.0	30.0	27.5	3	6.5	21	23	19.5	
PRESIDENT LINCOLN	KDBG	3	40.1 N	145.8 E	06	21	50	1 NM	50	0993.8	20.0	17.2	10	13	21	8	13	
SEALAND FREEDOM	WGJW	3	48.2 N	174.7 E	06	27	M 35	10 NM	25	0996.0	12.0	11.0	6	23	26	6	24.5	
SEALAND DEVELOPER	KHRH	4	46.7 N	154.0 E	00	26	M 45	5 NM	03	0993.2	13.0	13.0	8	24.5	24	12	24.5	
SEALAND FREEDOM	WGJW	4	50.0 N	173.1 W	06	34	M 27	10 NM	03	1000.0	9.0	9.0	6	16.5	02	8	32.5	
	ELTD5	4	53.2 N	151.6 W	12	12	M 50	5 NM	03	0980.0	10.0	14.0	8	13	12	8	13	
GLACIER BAY	KACF	4	47.2 N	130.7 W	12	25	50	5 NM		1002.5	15.0	13.0	3	11.5	27	9	10	
OCTA	A8QG	4	48.2 N	159.8 E	18	27	M 48	200 YD	07	0994.5	10.0	6.0	7	14.5	25	7	14.5	
SEA LIGHT	ELDE9	4	47.2 N	161.5 E	18	28	M 48	2 NM	81	0994.5	9.5	10.0	10	19.5	28	10	23	
	KRJG	4	54.1 N	157.9 W	18	35	M 38	2 NM	80	0976.0	9.0	11.3	10	19.5	24	12	26	
SEALAND INNOVATOR	WGKF	5	46.4 N	168.4 E	00	26	M 35	5 NM	80	0997.5	12.0	9.0	10	23	25	12	24.5	
TARPON	WYL5445	5	59.0 N	151.5 W	08	06	M 49	5 NM	00	0989.0	10.0		6	11.5	12	8	8	
PRESIDENT PIERCE	WUBV	5	38.0 N	170.4 W	12	27	63	10 NM	02	1007.5	20.0	18.3	4	10	29	8	13	
FRANCIS SINCERE NO 6	5MCN	5	45.8 N	179.5 E	18	29	M 54	5 NM	03	1005.0	11.0	12.0	4	8	29	9	13	
ARCO FAIRBANKS	WGWB	5	58.2 N	142.4 W	18	11	55	2 NM	21	0988.0		10.6	6	14.5	16	8	19.5	
	H9DO	6	44.1 N	171.2 W	00	25	M 41	< 50 YD	99	0990.0	12.0	11.0	15	24.5				
	KRJG	6	54.2 N	179.1 W	06	01	M 07	10 NM	00	1012.4	9.5		2	1.5	22	15	26	
SEALAND FREEDOM	WGJW	6	48.7 N	147.8 W	06	11	M 31	5 NM		0970.5	12.0	12.0	5	6.5	26	8	32.5	
ARCO ALASKA	KSBK	6	43.7 N	127.3 W	18	16	M 21	2 NM	12	1010.6	15.9	12.1	2	5	29	10	24.5	
PACIFIC VICTORY	H8ZQ	7	34.5 N	156.4 W	00	32	36	5 NM	07	1012.0	22.0	23.0	5	14.5	32	7	26	
SEALAND FREEDOM	WGJW	7	48.6 N	138.0 W	00	19	M 30	10 NM	01	0981.5	15.0	14.0	5	16.5	17	9	24.5	
	KRJG	7	50.5 N	164.5 E	12	27	M 25	5 NM	25	1018.0	8.0		6	21	27	8	24	
	KPFP	7	43.6 N	152.5 W	18	30	M 30	10 NM	00	1007.0	11.1	12.7	3	8	27	12	28	
ARCO ALASKA	KSBK	7	48.5 N	131.9 W	18	16	M 19	5 NM	01	1011.9	14.3	11.0	1	3	28	12	28	
MOBIL ARCTIC	KSPY	7	52.7 N	134.8 W	18	18	40			0999.9	13.3	12.2	3	13	19	8	24.5	
TARPON	WYL5445	7	58.0 N	151.2 W	18	33	M 48	2 NM		0978.5	8.0		6	14.5	09	10	6.5	
BLUE COSMO	JCBV	8	34.5 N	146.7 E	00	05	M 32	5 NM	02	1015.0	19.0	24.2	5	14.5	06	7	24.5	
PHILADELPHIA	WJRO	8	56.1 N	138.5 W	00	22	M 22	5 NM	02	0981.0	12.8	11.7	5	14.5	18	13	29.5	
ARCO ALASKA	KSBK	8	53.3 N	134.1 W	18	20	M 08	10 NM	15	0997.2	11.0	9.3	2	1.5	25	12	24.5	
GALVESTON	KBGA	10	50.9 N	132.3 W	06	19	55	5 NM	18	0981.1	10.6	12.2	6	13	16	12	24.5	
BLUE COSMO	JCBV	10	34.6 N	155.2 E	12	07	M 20	5 NM	03	1019.0	19.0	23.5	6	11.5	05	8	26	
GLACIER BAY	KACF	10	53.9 N	133.8 W	18	17	50	5 NM	00	0981.5	13.0	9.0	5	19.5	22	9	18	
	KLHG	10	46.9 N	137.7 W	18	27	30	10 NM	25	1000.5	10.2		2	8	27	8	29.5	
CHEVRON WASHINGTON	KFDB	10	52.5 N	136.8 W	23	27	M 29	10 NM	16	0987.4	10.6		3	6.5	26	6	26	
	KLHG	11	47.2 N	138.6 W	00	29	35	10 NM	02	1002.5	11.1		2	8	28	15	24.5	
SEALAND FREEDOM	WGJW	11	49.1 N	135.1 W	06	29	M 20	10 NM	01	1000.0	12.0	13.0	5	3	24	7	32.5	
AQUARIUS	WSKJ	11	29.3 N	131.6 E	06	06	M 29	5 NM	00	1008.0	24.0	26.1	5	6.5	07	15	24.5	
	BLHY	11	38.0 N	147.8 W	11	24	M 48	10 NM	01	1012.0	20.0	20.0						
EVER SPRING	H3WZ	12	36.4 N	136.3 W	00	26	M 25			1017.0	23.0	18.0	4	5	26	19	29.5	
PACIFIC VICTORY	H8ZQ	12	38.2 N	176.6 W	00	06	17	5 NM	00	1025.0	18.0	20.0	4	6.5	06	6	29.5	
CHEVRON WASHINGTON	KFDB	12	47.2 N	131.8 W	06	15	M 55	2 NM	80	0985.0	11.1		7	8	15	7	28	
KOREAN JACEWON	D7PT	13	52.4 N	134.6 W	00	34	M 55	200 YD	65	0974.0	10.0	12.0	8	19.5	14	12	13	
GOLDEN APO	DUZH	13	50.4 N	129.8 W	00	24	M 60	200 YD	65	0977.5	10.0	12.0	12	23	24	15	24.5	
TONSONIA	KJDG	13	51.0 N	135.0 W	00	30	M 36	2 NM	52	0983.0	9.4	12.2	6	26	29	8	26	
CHEVRON WASHINGTON	KFDB	13	46.2 N	130.7 W	06	26	M 35	10 NM	16	1013.2	12.0		6	16.5	24	12	29.5	
SEALAND MARINER	KGJF	13	44.2 N	133.4 W	06	27	M 33	10 NM	02	1019.6	13.0	16.0	5	10	27	10	32.5	
ARCO ALASKA	KSBK	13	51.6 N	134.3 W	18	25	M 25	10 NM	15	1008.9	13.8	8.3	2	5	21	6	28	
EXXON NEW ORLEANS	WNDM	13	42.4 N	126.8 W	18	30	M 15	10 NM	01	1028.0	17.2	15.6	3	3	30	7	29.5	
ARCO ALASKA	KSBK	14	51.1 N	133.2 W	00	29	M 28	5 NM	16	1013.5	12.7	8.3	3	5	22	7	28	
GREEN MAYA	JERV	14	42.5 N	158.2 E	06	15	M 43	2 NM	61	0998.5	16.0	15.0	6	23	15	7	32.5	
PRESIDENT HOOVER	WTST	14	37.6 N	152.6 E	06	31	30	10 NM	02	0999.0	19.4	24.8	6	10	11	11	24.5	
SKAUGRAN	LNUK	14	47.2 N	156.7 E	12	16	M 47	2 NM	63	0986.0	13.0	11.0	XX	26				
PRESIDENT MADISON	WCIP	15	45.8 N	163.4 W	06	04	44	5 NM	02	1015.0	8.3	6.7	10	18	03	11	24.5	
PACKING	ELRX3	16	46.6 N	161.5 W	00	06	M 45	.25 NM		1006.0	11.0	11.0	10	10	07	12	26	
SEALAND FREEDOM	WGJW	16	42.8 N	167.6 E	00	33	M 23	10 NM	01	1017.0	12.0	12.0	5	8	16	6	24.5	
PACIFIC VICTORY	H8ZQ	17	41.8 N	146.1 W	00	16	32	.5 NM	10	1015.0	14.0	13.0	5	8	16	7	26	
SEALAND FREEDOM	KLHG	17	54.2 N	160.9 W	12	10	36	10 NM	00	1021.2	6.7		4	10	12	11	26	
HANJIN INCHEON	WGJW	17	37.7 N	150.0 E	18	18	M 48	2 NM	81	1004.0	22.0	22.0	7	26	18	7	26	
	3EUB	18	37.0 N	143.8 E	00	30	M 16	.25 NM	55	1015.0	20.0	11.0	7	24.5	10	8	16.5	
VAN CONQUEROR	A8TB	18	42.3 N	156.4 E	00	16	M 53	.5 NM	18	1010.0	17.0	14.0	12	14.5	16	19	18	
	KLHG	18	54.6 N	158.2 W	00	08	35	10 NM	03	1024.3	8.9		4	10	11	11	24.5	
LNG TAURUS	WDZW	20	26.6 N	125.2 E	12	02	M 34	5 NM	00	1021.5	23.0	27.2	7	29.5	02	9	14.5	
HANJIN INCHEON	3EUB	21	46.6 N	167.5 E	00	32	M 34	< 50 YD		1025.0	9.0	11.0	10	24.5	25	8	16.5	
HANJIN INCHEON	3EUB	22	48.7 N	176.8 E	00	36	M 41	50 YD	90	1023.0	9.0	10.0	13	24.5	27	10	16.5	
PACKING	ELRX6	22	42.4 N	144.8 E	00	22	M 43	5 NM	03	1005.0	13.0	11.0	6	31	23	7	16.5	
PRESIDENT WASHINGTON	WHPN	24	53.0 N	143.2 W	18	28	M 50	5 NM	01	0999.0	9.4	11.1	8	13	28	8	16.5	
PRESIDENT WASHINGTON	WHPN	25	50.2 N	153.6 W	06	29	M 50	5 NM	60	1001.0	8.2	11.0	8	10	29	8	11.5	
	C6PJ	26	32.1 N	147.2 W	18	02	M 33	5 NM	03	1021.0	20.0	21.0	8	24.5	32	9	18	
SEVEN OCEAN	DZRK	28	41.6 N	142.0 E	00	29	M 36	5 NM	80	1005.0	12.0	17.0	8	11.5	30	18	26	
TONSONIA	KRJG	28	41.5 N	142.6 E	00	23	M 14	10 NM	03	1017.0	11.0	14.3	3	10	27	12	29.5	
	KJDG	28	41.3 N	126.9 W	12	22	M 48	1 NM		1010.0	15.6	15.6						
	KRJP	28	38.3 N	164.8 E	12	22	38	5 NM	00	1005.0	18.4	18.0	10	24.5				
PRESIDENT TAFT	WLDT	28	29.4 N	128.6 E	18	25	60	10 NM	02	1007.5	21.7	26.7	3	8	25	5	11.5	
	KRJG	29	43.5 N	176.7 E	06	24	M 24	10 NM	50	0996.6	12.3		6	10	21	12	24.5	
AQUARIUS	WSKJ	30	25.1 N	120.6 E	12	06	M 52	10 NM	00	1014.0	21.0	23.3						
SEA FORTUNE	A8LL	31	46.6 N	161.7 W	00	20	M 48	5 NM	02	0984.0	12.0	12.0	12	8	27	12	10	
BRIGHT SUN	H3AG	31	53.4 N	147.5 W	06	12	M 46	10 NM	03	0998.0	13.0	10.0	8	24.5	12	9	24.5	
AQUA CITY	C6BZ	31	41.4 N	177.9 W	18	28	M 51			1001.0	15.0	13.0	8	10	27	8	11.5	
CLOVER TRUST	H0ZP	31	50.5 N	142.9 W	18	13	M 48	.5 NM	62	0986.5	10.0	10.0	7	14.5	13	7	14.5	
	KRJG	31	51.2 N	150.6 W	18	27	M 20	5 NM		0978.0	8.0		2	16.5	11	12	46	

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea	Wave†	Swell Waves		
			Lat. deg.	Long. deg.		Dir. (pt)	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. (pt)	Period sec.	Height ft.
	PACIFIC	NOV.															
AQUA CITY	C6BZ	1	41.4 N	176.1 W	00	27	N 50			1006.0	14.0	16.0	8	10	27	9	11.5
TOWER BRIDGE	D5NW	1	43.3 N	173.1 W	00	27	N 58	5 NM	02	0995.5	12.5	10.0	13	23	28	14	19.5
GALVESTON	KBGA	1	57.6 N	144.7 W	00	13	65	10 NM	02	1015.0	6.7	8.9	12	23	12	9	16.5
CHEVRON ARIZONA	KGBE	1	52.3 N	136.4 W	00	13	N 54	5 NM	02	1001.2	5.6		2	13	12	7	19.5
	KRJG	1	51.3 N	147.4 W	00	28	N 23	2 NM	61	0978.0	8.0	9.7	10	11.5	12	13	29.5
	LIOL	1	54.3 N	154.5 W	00	07	N 48	.5 NM	62	0978.5	9.5	11.1					
LUNA MAERSK	OWDX	1	47.9 N	176.4 W	00	34	50	2 NM	62	0982.8	7.5	6.0	9	23	34	9	23
PRESIDENT GRANT	WEZD	1	37.1 N	141.3 W	00	19	40	.5 NM	63	1007.0	20.0	21.1	9	24.5	19	8	26
SEALAND EXPLORER	WGJF	1	43.8 N	175.9 W	06	29	N 37	10 NM	18	1006.8	10.5	8.0	8	16.5	29	14	24.5
CHEVRON WASHINGTON	KFDB	1	53.6 N	137.6 W	12	10	N 55	2 NM	64	0983.8	5.5		9	26	13	10	29.5
	WCSN	1	56.1 N	141.0 W	12	10	55	2 NM	07	0992.3	5.0	8.9	6	23			
BUNGA MELAWIS	9MUT	1	48.8 N	157.8 W	18	30	N 42	5 NM	01	0982.0	8.5	11.0	6	23	29	7	24.5
ORIENTAL EXECUTIVE	D5AN	1	42.1 N	142.0 W	18	21	N 48	5 NM	03	0986.0	16.5	15.0	6	8	22	9	11.5
PACIFIC VICTORY	H8ZQ	1	49.6 N	140.8 W	18	23	30			0976.0	9.0	9.0	5	10	22	6	26
EVER SHINE	HPET	1	42.5 N	148.5 W	18	28	N 51	1 NM	07	0987.0	13.0	15.0	11	23	26	17	36
WESTWARD VENTURE	KHJB	1	55.4 N	143.2 W	18	07	N 50			0983.0	10.0	8.9	14	32.5	07	14	36.5
ARCO TEXAS	KNFD	1	59.7 N	145.3 W	18	01	20	5 NM	00	0998.0	2.2	9.4	2	6.5	13	8	29.5
MOBIL ARCTIC	KSPY	1	55.1 N	138.5 W	18	08	50	2 NM	15	0984.0	5.6	8.3	3	10	13	6	19.5
TEXACO RHODE ISLAND	WFDW	1	57.6 N	147.8 W	18	09	34	10 NM	03	0992.9	6.2	7.8	13	24.5	09	13	24.5
	WPFZ	1	41.5 N	157.0 W	18	29	60	5 NM	26	1004.4	12.8	14.0	10	16.5	29	13	41
BUNGA MELAWIS	9MUT	2	48.8 N	159.2 W	00	29	N 50	10 NM	03	0990.0	9.5	12.0	8	13	28	10	29.5
EVER SHINE	HPET	2	42.0 N	149.3 W	00	28	N 51	1 NM	10	0994.0	14.0	15.0	11	23	26	17	36
GALVESTON	KBGA	2	56.3 N	141.6 W	00	07	65	5 NM	02	0983.8	4.4	7.8	12	26	12	10	19.5
	WPFZ	2	41.0 N	155.5 W	00	29	50	5 NM	07	1011.0	13.9	15.0	10	13	29	10	24.5
MING UNIVERSE	PLHZ	2	36.5 N	148.4 W	06	27	35	10 NM	18	1008.0	21.5	21.0	7	26	28	14	32.5
ORIENTAL EXECUTIVE	D5AN	2	40.8 N	137.1 W	06	25	N 54	5 NM	01	0993.0	16.0	16.0	8	10	25	11	14.5
PRESIDENT GRANT	WEZD	2	36.7 N	152.1 W	06	31	26			1016.9	16.1	19.4	7	16.5	30	8	24.5
ORIENTAL SOVEREIGN	A8UH	2	48.0 N	148.5 W	12	28	N 53	1 NM	51	0989.5	9.5	8.0					
	KRJG	2	49.5 N	128.8 W	12	13	N 52	5 NM		0974.0	8.5						
MOBIL MERIDIAN	KGSM	2	58.1 N	142.6 W	18	09	10	10 NM		0989.0	5.0	8.9	4	3	11	8	32.5
SPRING BLOSSOM	SKXY	2	36.5 N	133.8 W	18	28	N 35	10 NM	16	1015.7	20.5		8	16.5	26	12	29.5
TEXACO RHODE ISLAND	WFDW	2	56.0 N	143.6 W	18	07	36	2 NM	61	0981.4	7.8	7.8	10	24.5	08	14	23
OVERSEAS JUNEAU	WWND	2	45.3 N	128.3 W	18	22	50	1 NM	14	0986.5	13.3	10.6	5	10	22	8	29.5
SEA FORTUNE	A8LL	3	48.1 N	136.2 W	00	27	N 48	2 NM	62	0987.0	12.0	12.0	12	6.5	28	12	8
CHEVRON ARIZONA	KGBE	3	46.9 N	131.0 W	00	29	N 40	10 NM	01	0988.8	11.1		2	13	29	10	32.5
EXXON HOUSTON	KHBA	3	47.3 N	129.2 W	00	28	52			0982.0	12.0	12.5	7	32.5			
SPRING BLOSSOM	SKXY	3	36.0 N	131.0 W	00	30	N 26	10 NM	03	1017.5	21.9	22.8	5	6.5	29	12	24.5
ORIENTAL SOVEREIGN	A8UH	3	47.0 N	140.5 W	12	24	N 51	5 NM	00	0996.0	12.0	9.0					
SKOUBORD	LION	3	52.3 N	167.4 E	18	21	N 43	10 NM	01	0988.0	5.0	8.0	12	24.5			
CHARLOTTE LYKES	WPHZ	3	37.4 N	125.4 W	18	29	05	10 NM	02	1023.8	17.2	16.0	4	1.5	28	10	24.5
KENAI	WSNB	3	46.4 N	130.7 W	18	28	N 52	5 NM	02	1003.2	11.7	10.0	4	16	27	10	18
	3FPM2	3	47.9 N	126.5 W	22	24	N 35	5 NM	03	1005.8	12.5	11.8	11	24.5	27	12	26
SKOUBORD	LION	4	51.4 N	165.7 E	12	26	N 48			1002.0	4.0	7.5	12	29.5			
TARASCO	OXFU	4	42.1 N	127.3 W	18	14	N 06	10 NM	01	1024.0	16.4	15.0	0	0	30	10	29.5
PRESIDENT HOOVER	WTST	4	54.7 N	175.9 E	18	25	N 35	10 NM	02	0997.0	2.7	7.7	7	16.5	29	10	24.5
SKOUBORD	LION	5	50.8 N	163.6 E	00	27	N 48	10 NM	03	1005.5	2.0	7.0	12	29.5			
SEALAND INNOVATOR	WGKF	5	49.8 N	176.5 W	12	28	N 48	10 NM	18	1003.8	7.0	6.0	10	19.5	28	12	24.5
PRESIDENT HOOVER	WTST	5	52.4 N	168.4 E	12	31	N 26	10 NM	02	1006.0	1.2	7.8	5	11.5	26	12	24.5
SEALAND DEVELOPER	KHRH	5	52.5 N	177.5 W	18	29	N 48	5 NM	00	0997.0	4.0	5.0	5	18	27	8	19.5
PRESIDENT TAFT	WLDT	6	41.6 N	147.7 W	06	28	15	10 NM	01	1013.5	13.3	13.9	4	3	25	10	32.5
TARASCO	OXFU	10	54.4 N	169.6 W	00	30	N 38	10 NM	01	1004.8	7.8	10.0	10	29.5			
CHARLOTTE LYKES	WPHZ	10	34.4 N	178.4 E	12	12	30	5 NM	02	1013.0	17.5	20.0	6	13	12	10	24.5
SOUTHERN ACCORD	3FGE2	11	46.7 N	166.8 E	05	26	N 50	5 NM	03	1000.5	7.0	7.2	5	10	26	8	14.5
PRESIDENT LINCOLN	KDBG	11	50.7 N	150.2 E	06	27	56			0983.0	3.3		XX	13	27	12	14.5
POLAR ALASKA	5LEU	11	54.1 N	172.4 W	12	13	N 48	2 NM	63	0991.5	7.0	6.0					
ARCTIC TOKYO	5LJT	11	50.2 N	168.0 E	18	24	N 54			0992.0	4.0	6.0					
	5LOZ	12	41.8 N	168.2 E	00	19	N 52			1007.5	13.0	13.0	7	8	19	11	14.5
TARASCO	OXFU	12	53.3 N	172.7 E	00	23	N 48	2 NM	84	0987.0	5.0	9.0	8	29.5			
REGINA MAERSK	OXER	12	43.0 N	150.6 E	00	25	50	5 NM	03	1003.5	4.6		6	16.5			
NEPTUNE PEARL	S6GY	12	52.3 N	168.7 E	00	22	N 33	2 NM		0986.0	5.5		8	29.5	25	11	39
MANUKAI	KNLO	12	30.3 N	142.4 W	06	36	N 16	5 NM	25	1014.0	17.2	21.0			33	6	24.5
SOUTHERN ACCORD	3FGE2	12	48.7 N	176.0 E	11	18	N 54	200 YD	21	0984.0	5.0	7.0	7	13	18	10	18
ARCTIC TOKYO	5LJT	12	47.4 N	166.0 E	12	25	N 62			0984.0	4.0	6.0	10	19.5			
	5MGH	12	50.0 N	168.2 E	18	26	N 58	5 NM		0974.5	2.5	10.0	8	29.5	26	10	29.5
PRESIDENT TYLER	WEZM	12	44.3 N	178.1 W	18	21	N 52	5 NM	60	1004.0	11.1	8.9					
	3FPM2	12	53.0 N	173.8 E	19	20	N 58	1 NM	07	0951.5	5.0	6.1	6	16.5	21	10	16.5
	5MGH	13	50.1 N	169.8 E	00	26	N 55	2 NM	26	0978.5	4.0	10.0	8	29.5	26	10	29.5
GREEN MAYA	JERN	13	52.1 N	171.1 E	00	23	N 60	.5 NM	80	0963.0	4.0	5.5	7	10	23	10	46
EVER LIVING	HKHG	13	46.1 N	174.1 W	06	24	N 38	5 NM	01	0993.0	7.0	9.0	7	19.5	08	8	24.5
TARASCO	OXFU	13	53.0 N	173.5 E	06	24	N 52	1 NM	86	0966.0	3.4	9.0	6	16.5			
NEPTUNE PEARL	S6GY	13	50.6 N	160.5 E	06	27	N 46	2 NM	88	0983.0	0.0				27	8	32.5
OLGA TOPIC	A8EE	13	39.1 N	150.3 W	12	29	50			1012.0	11.0	15.0	10	19.5			
ARCTIC TOKYO	5LJT	14	41.5 N	159.3 E	00	29	N 50	2 NM	26	1008.0	6.0	14.0	8	13			
NEPTUNE PEARL	S6GY	14	48.2 N	155.9 E	00	29	N 39			0991.0	3.0		8	24.5	28	14	32.5
SEALAND ENDURANCE	KGJX	14	37.9 N	157.7 E	06	28	N 37	5 NM	16	1017.7	12.2	17.0	6	10	28	16	28
STREAM MAWSER	FLUN	14	41.2 N	169.9 E	12	29	N 38	5 NM	01	1006.0	5.5		11	29.5			
SEALAND PATRIOT	KHRF	14	39.0 N	131.3 W	18	16	N 50	1 NM	65	1006.5	17.0	15.0	4	6.5	16	6	13
BARBAROSSA	DDKX	15	53.8 N	174.1 W	00	22	27	2 NM	69	0988.0	1.5	5.5	7	13	25	16	31
	KRJG	15	54.1 N	157.9 W	00	23	N 48	2 NM	63	0983.5	4.5		16	29.5			
TARPON	WYLS445	15	59.1 N	150.4 W	00	09	50	2 NM	84	1003.8	5.0	8.9	4	8	09	9	19.5
TARASCO	OXFU	15	52.2 N	164.3 E	18	28	N 36	5 NM	88	0992.0	2.6	8.0	7	26			
DON JUAN	5FAN	16	35.4 N	164.4 E	06	21	N 40	5 NM	00	1011.0	19.0		8	26			
BARBAROSSA	DDKX	16	52.9 N	171.2 E	12	24	30	10 NM	68	0983.5	3.4	5.0	6	10	24	13	24.5
PRESIDENT CLEVELAND	KGXA	16	43.4 N	170.2 E	18	31	45	10 NM	01	0994.5	4.4	7.2	9	32.5	31	10	32.5
SEALAND FREEDOM	WGJW	16	38.6 N	162.5 W	18	30	N 40	10 NM	02	1017.0	13.0	16.0	3	16.5	29	12	26
TARPON	WYLS445	16	58.0 N	152.0 W	18	14	45	5 NM	70	0993.3		8.9	6	14.5	14	8	32.5
GREAT LAND	WFDP	16	53.8 N	136.0 W	23	21	N 48	10 NM	01	0996.8	10.6	11.1	4	10	23	9	21
ORIENTAL KNIGHT	BMCP	17	35.8 N	166.4 W	00	26	25	5 NM	01	1022.0	17.0	19.0	8	26	26	8	29.5
SEALAND ENDURANCE	KGJX	17	43.1 N	173.0 W	00	17	N 44	1 NM	40	0987.5	10.0	9.0	5	10	27	18	26
SEALAND LIBERATOR	KHRP	17	39.5 N	170.4 E	00	29	N 48	5 NM	15	1013.4	14.0	15.0	5	14.5	30	9	29.5
PHILADELPHIA	WJGO	17	54.9 N	136.5 W	00	24	N 45	5 NM	01	0991.2	6.1	8.9	8	32.5	23	8	36

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind			Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves*		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°		Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	NOV.																
KOREAN JACEMON	D7PT	17	38.9 N	145.2 W	06	27	N	53	5	NM		1010.0	14.0	15.0	7	11.5			
SEA BELLS	ELCN7	17	45.7 N	168.4 E	06	30	N	50	5	NM	03	1003.0	5.0	8.5	8	14.5	30	8	14.5
ORIENTAL EXECUTIVE	D5AN	17	48.8 N	179.3 W	12	34	N	64	.25	NM	63	0972.5	6.0	7.0					
	H9VS	17	46.1 N	175.3 W	16	24		23	50	YD	40	0997.1	5.7	13.0	5	6.5	24	6	24.5
PRESIDENT MADISON	WCIP	17	38.8 N	179.5 E	18	32		30	10	NM	01	1015.5	11.1	11.1	7	19.5	32	14	24.5
EVER GRADE	3FDW2	18	33.0 N	132.2 W	00	26	N	22	5	NM	02	1021.7	21.0	19.0	5	6.5	32	15	24.5
ORIENTAL MINISTER	ELDK3	18	41.6 N	171.2 W	00	26		45	5	NM	00	1004.0	12.0	14.0	8	19.5	26	14	39
PRESIDENT CLEVELAND	KGXA	18	42.0 N	177.8 E	00	29		35	10	NM	02	1018.0	10.0	11.1	13	36	30	16	32.5
PRESIDENT MADISON	WCIP	18	38.0 N	175.5 W	06	32		25	25	NM	01	1021.1	13.8	13.9	8	16.5	32	12	26
SEALAND FREEDOM	WGJW	18	36.4 N	173.2 W	06	31	N	24	10	NM	01	1023.5	16.0	18.0	5	8	30	8	36
SEA DIAMOND	3FJR2	18	44.3 N	156.2 W	12	26	N	54	2	NM	64	1001.0	10.0	9.0	5	8	26	6	8
BARBAROSSA	ODHX	18	47.6 N	154.3 E	12	33		37	10	NM	02	1003.0	1.0	3.5	7	13	28	10	24.5
	HQST	18	40.3 N	127.1 W	12	30		35	5	NM	01	1019.0	14.5		6	8	29	12	29.5
B.T. ALASKA	WFCE	18	39.9 N	125.2 W	18	33	N	17	10	NM	02	1024.0	14.4	14.4	3	3	28	8	24.5
ORIENTAL MINISTER	ELDK3	19	40.5 N	162.0 W	00	32		30	10	NM	01	1025.0	13.0	15.0	6	10	29	12	29.5
SEALAND ENDURANCE	KGJX	19	48.8 N	149.7 W	00	26	N	45	5	NM	03	0989.9	10.6	8.0	7	11.5	26	15	26
ORIENTAL EXECUTIVE	D5AN	19	46.0 N	166.2 E	06	29	N	60				0997.0	4.0	6.0	8	11.5	27	13	26
SEA BELLS	ELCN7	19	46.4 N	176.0 W	06	17	N	50	.25	NM	63	0996.5	6.0	9.0	8	10	17	8	10
ORIENTAL EXECUTIVE	D5AN	20	44.4 N	161.4 E	00	30	N	48	5	NM	26	1008.0	5.0	7.0	7	10	28	10	14.5
	DUFE	20	53.8 N	174.9 W	00	24	N	25	10	NM	14	0977.0	6.0	4.0	6	5	23	XX	34.5
SPRING BIRD	SKKZ	20	35.2 N	140.9 E	00	25	N	50	.25	NM	50	1007.5	14.0	23.0	14	26			
MAERSK WAVE	ELAH3	20	53.7 N	178.3 W	06	32		52	5	NM	25	0977.0	4.0		12	16.5			
PRESIDENT CLEVELAND	KGXA	20	44.7 N	156.9 W	12	19		40	2	NM	51	0995.0	13.3	8.9	12	19.5	19	12	24.5
GREAT LAND	WFDP	20	52.8 N	134.3 W	23	21	N	14	10	NM	14	1019.4	9.5	10.6	2	3	27	10	24.5
YAMASHIN MARU	JBES	21	52.1 N	147.1 W	00	22	N	36	2	NM	07	0991.5	10.5	7.5	8	13	22	12	26
PRESIDENT CLEVELAND	KGXA	21	45.7 N	149.9 W	06	26		24	10	NM	01	1002.8	10.6	8.3	6	8	22	10	32.5
	GVRJ	21	24.4 N	142.5 E	06	27		45	2	NM	16	1004.5	25.0	26.0	XX	16.5	23	XX	26
TARPON	WYLS445	21	59.4 N	140.1 W	12	12	N	60	200	YD	65	0991.0		8.9	6	19.5	12	7	24.5
	DUEE	21	50.1 N	176.0 E	18	29	N	28	.25	NM	85	0998.8	2.5	4.0	6	11.5	31	14	28
	DUFE	22	49.5 N	175.2 E	00	27	N	18	1	NM	85	1006.8	2.0	4.0	6	10	21	13	26
PRESIDENT CLEVELAND	KGXA	22	47.4 N	139.2 W	06	25		45	2	NM	61	0992.9	12.2	1.0	8	23	25	12	28
B.T. ALASKA	WFCE	22	53.3 N	137.5 W	12	20	N	55	2	NM	07	0964.3	10.0	8.9	5	16.5	20	10	21
PRESIDENT WASHINGTON	WHPN	22	50.6 N	140.6 W	12	25	N	35	10	NM	81	0980.0	6.7	8.3	5	11.5	XX	9	24.5
	3EGX3	22	54.0 N	134.7 W	18	21	N	36	5	NM	01	0979.0	8.0	13.0	6	19.5	21	8	26
	ELDX6	22	48.9 N	130.9 W	18	19	N	49	.25	NM	50	1002.0	11.0	10.0	11	18	19	11	16.5
GLACIER BAY	KACF	22	52.5 N	134.5 W	18	25		48	2	NM	16	0984.2	9.5	7.8	5	11.5	25	9	29.5
GALVESTON	KBSA	22	53.9 N	136.5 W	18	23		60	5	NM	18	0978.0	5.0	5.6	14	26	23	10	23
	3ECX3	23	54.8 N	135.5 W	00	25	N	28	10	NM	01	0987.0	7.0	12.0	4	19.5	25	12	26
GALVESTON	KBGA	23	52.9 N	135.5 W	00	21	N	30	10	NM	02	0981.0	5.6	5.6	22	24.5	23	10	23
	SLFY	23	47.2 N	158.2 W	06	30		44				1004.0	6.5	8.1	6	16.5	27	12	24.5
KOREAN MONIS ONE	D7XX	24	40.6 N	170.4 E	00	27	N	52				1002.0	8.5	13.0	9	10	27	15	11.5
GALLEON DIGNITY	D2FG	24	39.9 N	163.8 W	12	11	N	68	2	NM	60	1002.1	13.0	12.0	5	6.5	10	6	8
	JCUF	25	39.4 N	170.9 W	12	31	N	42				1015.0	9.5	12.0	4	6.5	31	7	32.5
PRESIDENT JEFFERSON	WPCE	25	41.8 N	169.7 W	12	01		48	5	NM	02	1009.0	5.6	8.6	6	21	01	6	24.5
	JCUF	26	38.2 N	169.0 W	00	33	N	27	10	NM	01	1025.4	12.0	15.0	4	5	31	8	32.5
	LIOS	26	50.4 N	130.7 W	06	19		50				0991.2	8.2						
QUEEN OPAL	H8DF	27	50.4 N	134.9 W	00	11	N	50	.25	NM	63	0991.0		5.5	9	19.5	12	9	23
	HPJI	27	44.3 N	151.8 W	00	34	N	45	5	NM	00	1013.0	9.0	10.0	3	10	35	15	24.5
	JCUF	27	36.9 N	163.0 W	00	27	N	04	10	NM	01	1028.0	14.5	14.0	2	0	33	8	32.5
GREEN WOOD	3FPB2	27	50.0 N	176.5 W	06	25	N	50	200	YD	22	0982.0	4.0	11.2	8	13	25	8	13
BUNGA MELAWIS	9MUT	27	46.9 N	179.9 E	06	28	N	54	5	NM	02	1002.0	5.0	8.0					
GLACIER BAY	KACF	27	53.0 N	136.0 W	06	09		55	1	NM	62	0994.5	7.0	6.1	6	14.5	10	9	28
PRESIDENT TYLER	WEZM	27	50.1 N	129.2 W	06	12	N	55	2	NM		0994.4	5.6	8.3	9	39	12	12	32.5
MING MOON	BLMO	27	35.5 N	130.9 W	11	20	N	50	1	NM	50	1008.0	19.0	17.0	12	16.5	21	10	13
	KRHG	27	25.9 N	124.5 W	12	22	N	05	10	NM	02	1022.0	19.0	19.0	1	1.5	30	12	32.5
WESTWARD VENTURE	KHJB	27	53.7 N	135.5 W	18	02	N	31	5	NM	02	0994.0	8.0	7.8	6	5	15	8	28
PRESIDENT MADISON	WCIP	27	37.3 N	133.8 W	18	28		40	5	NM	01	1008.0	17.2	15.0	8	24.5	29	10	32.5
B.T. ALASKA	WFSE	27	52.6 N	132.9 W	18	01	N	31	5	NM	02	0998.0	6.7	8.3	4	6.5	14	11	29.5
PHILADELPHIA	WJGO	27	52.8 N	137.6 W	18	01	N	27	10	NM	01	0995.5	5.6	8.3	3	8	11	7	26
GREEN WOOD	3FPB2	28	51.1 N	169.6 W	00	24	N	45	.25	NM	22	0986.0	5.0	6.4	23	41	25	25	41
ARCO ALASKA	KSBK	28	49.2 N	132.6 W	00	36	N	28	1	NM	54	0985.1	7.8	5.0	3	5	13	7	24.5
LEDA MAERSK	OULU	28	47.7 N	164.9 W	00	27		40	10	NM	25	1005.0	5.9	9.0	XX	13	27	9	24.5
PRESIDENT MADISON	WCIP	28	37.3 N	134.8 W	00	29		43	10	NM	15	1015.0	15.0	15.0	6	23	29	9	24.5
B.T. ALASKA	WFSE	28	52.5 N	139.6 W	00	33	N	25	5	NM	80	1001.3	8.9	7.2	3	5	09	16	29.5
	3EGX3	28	52.7 N	172.2 W	03	26	N	46	2	NM	21	0984.0	4.0	9.0	7	13	26	15	32.5
GREEN WOOD	3FPB2	29	51.0 N	160.5 W	00	26	N	39				1001.0	5.0	6.6	13	24.5	25	13	24.5
	JCUF	29	37.8 N	150.5 W	00	23	N	12	10	NM	02	1023.5	15.0	14.5	3	1.5	27	8	32.5
PRESIDENT TYLER	WEZM	29	54.5 N	152.6 W	06	27	N	28	10	NM	90	0992.0	5.6	5.0	7	13	23	10	29.5
	3EGX3	29	49.8 N	179.6 W	22	22	N	36				0986.0	4.0	10.0	6	13	22	10	26
PACIFIC VICTORY	H8ZG	30	47.7 N	131.8 W	00	27		35	5	NM	00	0987.0	14.0	9.0	5	13	27	7	26

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir.	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir.	Swell Waves Period sec.	Swell Waves Height ft.
	PACIFIC	DEC.															
HANJIN INCHEON	3EUB	2	47.1 N	171.7 E	00	30	M 30	5 NM	01	1012.0	3.0	7.0	10	24.5	31	10	24.5
USNS PASSUMPSIC TAO 107	NHNB	2	21.2 N	121.6 E	00	03	M 35			1015.6	21.7	27.8	4	6.5	04	10	24.5
PRESIDENT TYLER	WEZH	2	52.1 N	169.1 E	06	36	M 26	10 NM	03	1012.0	0.0	3.3	3	6.5	01	10	24.5
	3FGZ2	2	50.8 N	132.8 W	11	14	M 58	10 NM	02	1010.0	8.0	10.0	5	11.5	16	6	10
HANJIN INCHEON	YEUB	3	48.9 N	179.8 W	00	33	M 30	5 NM	50	1006.0	2.0	5.0	11	24.5	32	12	24.5
USNS PASSUMPSIC TAO 107	NHNB	3	21.7 N	121.0 E	00	03	M 25	2 NM		1014.4	24.4	25.6	3	6.5	04	6	31
STAR HONGKONG	ZCKP	3	48.1 N	154.7 W	00	09	M 54	.5 NM	10	0980.5	4.0		7	11.5	09	10	16.5
TOYOTA #24	5MYS	3	30.6 N	163.9 W	06	30	M 44	10 NM	03	1012.0	16.5	22.0	7	10	31	11	24.5
HYUNDAI CON # 22	D9MS	3	40.0 N	173.0 E	06	28	M 24	200 YD		0991.4	13.0	12.0	8	24.5	14	9	14.5
OAK SUN	ELCF2	3	47.9 N	152.5 W	06	14	M 55			0980.0	7.5	7.0					
	HZAF	3	19.5 N	178.3 E	18	07	20	10 NM	02	1013.3	26.0		7	6.5	30	30	49
PACIFIC EXPRESS	D9CB	4	41.2 N	178.1 E	00	20	M 28			0975.0	12.5	13.0	6	13	15	8	26
CHEVRON COLORADO	KLWZ	4	58.5 N	143.8 W	06	14	33	5 NM		1001.2	7.2		5	10	14	14	26
	LMWO	4	37.0 N	179.0 W	06	22	M 30	1 NM	80	0989.8	18.0	19.0	XX	26	22	XX	26
	YJWM2	4	46.0 N	173.0 W	12	04	M 49	50 YD	24	0970.0	4.0	8.0	20	13	20	19	13
MOBIL MERIDIAN	KGSN	5	58.0 N	142.2 W	06	16	25	10 NM	25	0994.2	7.8	6.7	2	5	14	8	41
SEALAND INNOVATOR	WGKF	5	36.5 N	173.2 W	06	30	M 40	10 NM	00	1014.0	15.0	16.0	8	19.5	30	10	24.5
PACIFIC EXPRESS	D9CB	5	42.5 N	162.3 W	21	29	M 32	5 NM	02	1008.0	9.0	12.0	8	26	32	8	26
PACIFIC VICTORY	H8ZQ	6	39.8 N	153.3 E	00	19	M 31			1010.0	14.0	14.0	5	19.5	19	6	29.5
MOBIL MERIDIAN	KGSM	6	55.7 N	178.1 W	06	18	25	2 NM	60	0983.3	8.3	7.2	3	5	16	10	24.5
STAR CARRIER	D5MC	6	54.1 N	178.0 W	23	18	M 57	1 NM		0988.0	5.0	4.0	9	29.5	34	6	26
MOBIL MERIDIAN	KGSM	7	52.9 N	173.4 W	00	25	25	5 NM	15	1000.2	8.3	8.3	4	6.5	23	8	29.5
	3FGZ2	7	54.0 N	174.5 W	23	25	M 50	2 NM	49	0991.5	1.0	4.9	9	19.5	26	12	28
NEPTUNE DIAMOND	9HYY	8	53.7 N	173.2 W	00	26	M 43	10 NM	07	0995.2	2.5	4.3	7	13	26	15	29.5
CHEVRON COLORADO	KLWZ	8	54.3 N	136.9 W	00	27	18	5 NM	15	1008.0	5.0		4	5	26	12	26
PRESIDENT WASHINGTON	WHRN	8	52.9 N	179.8 W	00	26	M 45	10 NM	00	0999.0	2.2	3.9	3	16.5	26	9	26
STAR CARRIER	D5MC	8	53.6 N	172.1 E	06	28	M 25	1 NM	26	1001.0	1.0	2.0	9	23	10	7	26
PACIFIC EXPRESS	D9CB	8	39.0 N	134.3 W	12	36	M 27			1019.0	11.0	16.0	10	23	34	8	29.5
PACIFIC VICTORY	H8ZQ	8	42.2 N	167.6 E	12	04	M 33	2 NM		1014.0	5.0	8.0	3	10	04	6	29.5
SEALAND MARINER	KGJF	9	41.2 N	171.0 W	00	17	M 31	1 NM	20	1017.4	13.0	11.0	5	10	17	13	28
	LMWO	9	37.4 N	131.9 W	00	01	M 50	2 NM	82	1012.4	11.0	16.0	XX	13	36	XX	28
NEW INDEPENDENCE	5MOS	9	49.1 N	173.4 W	18	09	M 48	1 NM	61	0983.5	3.0	6.0					
GEMINI	3FPH2	9	47.2 N	175.2 W	23	18	M 48	5M YD	55	0968.6	7.0	5.3	8	18	18	11	29.5
GEMINI	3FPH2	10	47.2 N	175.2 W	00	19	M 55	50 YD	55	0967.0	7.0	5.8	8	18	09	11	32.5
	KRJG	10	44.7 N	172.7 E	00	30	M 30	10 NM	27	1004.7	3.5		6	11.5	06	11	26
BAY BRIDGE	3EYN	10	54.9 N	168.9 W	03	09	M 48	1 NM	36	0986.1	0.5	6.0	8	26	09	8	26
SEALAND DEVELOPER	KHPH	10	43.0 N	173.0 W	06	25	M 35	5 NM	00	1006.0	9.0	8.0	9	19.5	24	12	36
	KSJF	10	54.8 N	139.9 W	06	31	30	5 NM	00	1002.8	4.4	6.7	3	11.5	32	12	28
NEW INDEPENDENCE	5MOS	10	50.2 N	168.7 W	12	24	M 55	1 NM	10	0980.3	6.0	6.0					
SANKO ETERNITY	ELDV5	10	52.9 N	157.5 W	18	23	M 42	5 NM	02	0987.7	6.0	7.0	5	8	28	8	29.5
TONSONIA	KJDG	10	45.3 N	129.5 W	18	16	M 10	10 NM	02	1012.0	8.3	10.0	3	8	28	9	29.5
SANKO ETERNITY	ELDV5	11	52.9 N	157.8 W	00	24	M 55			0985.5	6.5	8.0	5	8	24	12	31
TYSON LYKES	WSCJ	11	43.2 N	144.8 W	00	26	10	5 NM	01	1014.0	9.4	6.3	2	3	26	15	26.5
ORIENTAL EXECUTIVE	D5AN	11	40.3 N	174.6 W	06	17	M 53	5 NM	01	1012.5	13.0	11.0					
TONSONIA	KJDG	11	40.9 N	126.3 W	12	22	M 12	10 NM	02	1016.3	10.0	11.7	3	6.5	29	11	29.5
CHARLOTTE MAERSK	OYIU	11	40.0 N	177.5 W	12	27	29	10 NM	80	1012.6	9.4		8	26			
GREEN WOOD	3FB82	11	52.8 N	142.5 W	18	24	M 32	.5 NM	21	0994.0	5.5		12	26	25	12	26
JINO	5MZW	12	36.9 N	142.5 E	20	02	M 47	5 NM	25	1000.5	19.0	18.0	6	31	02	6	29.5
MAMMOTH PINE	ELOY	12	32.4 N	150.0 E	00	14	M 50	10 NM	58	1009.0	17.0	22.0	6	8	14	9	13
EVER SHINE	HPEY	12	46.2 N	139.6 W	00	29	M 41	5 NM	00	1016.0	9.5	12.0	7	23	28	9	24.5
	LITL	12	49.5 N	143.4 W	00	27	M 48	5 NM	02	1013.0	7.8						
PHILADELPHIA	WJGO	12	55.2 N	140.9 W	00	24	M 36	5 NM		0994.6	6.1	6.7	5	13	27	6	29.5
PRESIDENT JOHNSON	WVHS	12	34.3 N	141.7 E	00	36	40	10 NM	15	0999.0	17.8	20.6	8	10	09	9	24.5
GREEN WOOD	3FB82	12	52.0 N	144.3 W	06	27	M 51	.25 NM	59	1004.0	5.0	8.5	16	26	27	16	24.5
	WSTS	12	53.9 N	141.5 W	06	27	M 49	5 NM	02	0998.2	4.5	8.9	7	19.5	27	11	29.5
	KRDB	12	49.2 N	133.8 W	12	29	35	2 NM	25	1011.9	6.7	10.0	6	24.5	29	6	24.5
	KSJF	12	44.1 N	129.2 W	12	32	30	5 NM	25	1008.0	6.9	11.1	2	10	32	10	24.5
ORIENTAL EXECUTIVE	D5AN	12	40.4 N	159.3 W	18	17	M 54			1011.0	14.5	11.0	6	10			
MOBIL MERIDIAN	KGSM	12	53.3 N	133.7 W	18	31	50	5 NM	16	1004.5	8.3	6.7	3	10	30	10	29.5
ORIENTAL EXECUTIVE	D5AN	13	40.3 N	156.6 W	00	18	M 49	2 NM		1012.5	15.0	11.0	5	10	19	9	16.5
FERNCROF	LLTJ	13	46.1 N	174.8 W	00	31	25	5 NM	81	1013.5	8.0		7	24.5	32	11	32.5
PHILADELPHIA	WJGO	13	56.9 N	145.4 W	00	25	M 20	5 NM	02	1002.4	5.0	6.7	6	11.5	27	6	24.5
SEALAND DEVELOPER	KHPH	13	37.3 N	162.6 E	03	17	M 57	2 NM	61		15.0	13.0	6	10	15	13	24.5
GREEN WOOD	3FB82	13	53.9 N	152.2 W	12	28	M 45			0990.0	5.0	10.0	15	24.5	27	15	24.5
EVER VITAL	8HCL	13	35.3 N	165.6 E	18	16	M 54			1007.0	13.0	14.0					
CRYSTAL STAR	D5TG	13	36.2 N	169.3 E	18	17	M 56	.25 NM	82	0997.9	16.0		12	19.5	16	14	21
MOBIL MERIDIAN	KGSN	13	56.5 N	139.2 W	18	24	50	5 NM	81	0976.9	6.1	6.7	4	6.5	24	8	19.5
SEALAND PATRIOT	KHRF	13	37.2 N	159.5 E	18	29	M 45	10 NM	02	1006.0	13.0	14.0	8	10	28	12	24.5
EXXON BOSTON	WNML	13	29.6 N	116.5 W	18	31	M 28	10 NM	15	1004.5	16.0	17.7	3	8	32	10	34.5
KAUAI	WSPH	13	32.2 N	122.4 W	18	34	45	5 NM	02	1014.3	14.4	16.1	10	24.5	32	15	24.5
NORTHERN HIGHWAY	JKMG	13	42.4 N	179.8 W	21	18	M 48	2 NM	20	1022.0	9.0	9.0	6	13	22	10	13
EVER LAUREL	BKHM	14	42.5 N	162.8 E	00	28	M 50	1 NM	95	0998.5	4.0	5.0	13	23	31	11	23
MOANA PACIFIC	H2ST	14	29.7 N	121.4 W	00	35	43	2 NM	07	1009.5	15.0	17.5	19	26			
KAUAI	WSPH	14	30.8 N	121.9 W	00	34	45	5 NM	01	1012.5		16.1	10	24.5	32	15	24.5
GREEN WOOD	3FB82	14	54.2 N	156.0 W	06	29	M 48	200 YD	22	1013.0	2.0	10.7	17	34.5	29	17	34.5
	9HYJ	14	50.8 N	179.5 E	06	18	M 55			0986.0	10.0	6.5					
CRYSTAL STAR	D5TG	14	36.3 N	166.9 E	06	28	M 28	5 NM	15	1019.6	13.0	15.0	10	19.5	28	12	24.5
K CHALLENGER	3EZT2	14	44.2 N	149.3 E	12	30	M 50	2 NM		0996.0	1.0	3.0	10	16.5	30	6	13
SANKO ETERNITY	ELDV5	14	53.5 N	172.5 W	12	17	M 49			1004.5	5.0	6.0	5	10	17	9	16.5
TARASCO	OXFU	14	39.0 N	153.6 W	12	07	M 60	2 NM	63	1018.5	10.3	13.0	12	26			
FALSTRIA	OYB6	14	50.0 N	172.4 W	12	18	M 47	5 NM	03	1014.1	4.4	5.5	10	24.5			
PRESIDENT JOHNSON	WVHS	14	37.4 N	168.1 E	12	32	35	10 NM	02	1023.0	11.7	16.1	6	16.5	31	9	24.5
MANINKAI	KMLO	14	33.7 N	134.5 W	20	35	M 48	5 NM	18	1015.7	13.3	17.0	7	13	35	9	16.5
SANKO ETERNITY	ELDV5	15	53.3 N	172.5 W	00	21	M 48	5 NM	02	1003.0	6.0	7.0			21	10	21
TARASCO	OXFU	15	39.7 N	150.9 W	06	09	M 45	2 NM	63	1023.5	11.4	14.0	10	26			
SEALAND FREEDOM	WGJN	15	47.9 N	144.5 W	06	34	M 25	10 NM	02	1027.0	7.0	7.0	5	6.5	32	8	24.5
GREAT LAND	WFDP	15	49.1 N	126.5 W	23	36	M 09	> 25 NM	01	1006.4	6.1	9.4	2	1.5	29	10	24.5
SEALAND FREEDOM	WGJN	16	48.1 N	131.6 W	06	32	M 33	10 NM	05	1016.0	6.0	8.0	5	6.5	33	11	24.5
PRESIDENT JOHNSON	WVHS	16	41.4 N	172.8 W	06	04	26	10 NM	03	1016.8	8.9	11.1	5	10	09	7	29.5
PACIFIC ANGEL	3EXQ2	16	43.8 N	157.8 W	18	10	M 45	2 NM	60	1022.0	9.0		6	14.5	09	9	26
PACIFIC ANGEL	3EXQ2	17	43.9 N	156.6 W	00	12	M 49	1 NM	60	1023.0	9.8		6	14.5	09	9	28

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility	Present Weather code	Pressure mb.	Temperature °C.		Sea Waves*		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.	n. mi.			Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	DEC.															
	KPKL	17	49.7 N	134.6 W	00	36	M 45	10 NM	02	1026.3	5.6	7.8	7	31			
ARCHON	KRHZ	17	34.5 N	144.6 E	06	36	M 40			1005.5	13.0		3	13	36	7	26
	WBCA	17	50.6 N	129.7 W	06	32	40	10 NM	02	1020.0	2.2	8.9	8	23	32	8	24.5
PRESIDENT JOHNSON	WXHS	17	42.0 N	162.5 W	06	13	20	10 NM	00	1009.0	12.2	10.0	5	6.5	11	10	24.5
PRESIDENT PIERCE	WUPV	17	35.3 N	153.7 E	18	32	48	10 NM	01	1009.0	15.6	17.8	5	8	29	8	16.5
ORIENTAL EXPLORER	RHDH	18	40.2 N	159.1 E	00	28	M 56	.5 NM		0980.0	10.0						
KOREAN WONIS ONE	DTXX	18	42.2 N	158.4 E	00	34	M 69	50 YD	97	0975.0	3.0	10.0	8	11.5	34	9	13
SEALAND ENDURANCE	KGJX	18	42.2 N	164.6 E	00	14	M 60	2 NM	53	0991.5	8.3	7.0	10	19.5	13	12	16.5
CHEVRON COLORADO	KLHZ	18	44.4 N	129.2 W	00	02	25	10 NM	01	1022.0	6.1		4	6.5	35	15	32.5
K CHALLENGER	3E7T2	18	50.5 N	175.8 E	06	03	M 28			1009.0	2.0	5.0	8	10	03	15	26
EVER SHINE	HPET	18	45.0 N	165.1 E	06	10	M 56	2 NM	51	0987.5	5.0	6.0					
EVER SUPERB	HONF	18	39.5 N	147.5 E	18	35	M 55	2 NM	91	0983.0	9.0	22.0	9	16.5	35	12	19.5
PRESIDENT PIERCE	WUPV	19	34.8 N	142.9 E	00	33	64	10 NM	02	1010.0	14.4	17.8	4	13	32	5	19.5
SANKO ETERNITY	ELTV5	20	49.0 N	158.0 E	00	34	M 50	< 50 YD	73	0976.0	0.0	4.0	12	19.5	35	13	18
	KRJF	20	37.1 N	179.4 W	06	08	M 15	> 25 NM		1022.6	15.0		2	1.5	29	15	36
GREEN WOOD	3FRB2	20	45.7 N	168.0 E	12	21	M 55			0997.0	2.0	6.5	13	23	21	13	21
ARCTIC TOKYO	5LJT	20	51.1 N	163.1 E	18	29	M 50	2 NM	07	0985.0	0.5	2.0	8	16.5	34	12	19.5
HANJIN INCHEON	3EUB	21	53.4 N	177.9 E	00	22	M 51	< 50 YD	52	1004.0		6.0	15	32.5	30	15	32.5
SEALAND MARINER	KGJF	22	42.8 N	178.0 W	12	33	M 40	5 NM	02	1022.3	4.0	9.0	7	13	33	8	24.5
PRESIDENT MADISON	WCIP	22	41.2 N	161.9 E	18	18	30	2 NM	60	1005.0	10.5	7.0	7	10	18	10	24.5
HANJIN INCHEON	3EUB	23	48.5 N	160.4 E	00	22	M 51	< 50 YD	97	0998.0		1.0	15	32.5	10	15	32.5
PRESIDENT MADISON	WCIP	23	41.9 N	164.7 E	00	19	30	.5 NM	10	1010.0	10.6	3.9	5	11.5	19	10	24.5
	KRJF	23	35.3 N	148.7 E	18	24	M 60	10 NM	01	1005.1	13.3						
ARCHON	KRHZ	24	31.0 N	171.0 W	00	27	M 33	2 NM	81	0995.0	14.0		6	10	36	10	24.5
EVER LYRIC	BKHI	24	37.6 N	175.4 W	23	03	M 35	2 NM	80	1015.0	11.0	14.0	8	24.5	04	10	23
NEW INDEPENDENCE	5MOS	26	54.0 N	162.3 W	18	17	M 50	.5 NM		1023.5	4.0	6.0					
HANJIN INCHEON	3EUB	27	52.0 N	169.2 E	00	22	M 57	< 50 YD	69	1016.0		1.0	15	32.5	05	15	32.5
QUATSINO SOUND	ELAW3	28	53.1 N	174.3 E	00	27	M 50			0986.0	0.5		7	24.5			
PRESIDENT PIERCE	WUPV	29	25.5 N	121.2 E	00	03	48	5 NM	02	1027.5	11.1	17.8	5	8	03	7	10
SEALAND ENDURANCE	KGJX	31	53.9 N	163.0 W	00	20	M 45	5 NM	02	0982.5	8.9	6.0	7	26	22	9	29.5

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

Continued from page 121.

SHIP NAME	VIA RADIO	VIA MAIL	SHIP NAME	VIA RADIO	VIA MAIL	SHIP NAME	VIA RADIO	VIA MAIL
KPSP		1	NTRI		127	WDZB	61	164
KSJF		90	NYGG	31	56	WEZA	2	9
LABZ		24	ONAO	43	32	WEZW		108
LIQL	20	71	OVRJ		44	WFJM	55	92
LIQS		21	OXZH	14	78	WGZK	16	76
LKUQ		16	OYRT		98	WIBX		1
LMWO	10	22	PPWG	2	1	WLGF	6	24
NADH		58	TCSX	22	31	WNDB		64
NEKE		3	TCTL		45	WPKB	53	127
NHIL		65	VPBW	56	72	WPOP		88
NHNS		113	WAKL		3	WQZ967G		125
NJAX	106	274	WBFZ		21	WSTS		41
NJDR		42	WBGA		31	WSUR		17
NJOV	65	65	WBVY	14	18	WTDF	141	175
NJTD	22	51	WCSN		19	WXCO		20
NOST	43	119	WCYJ		92	YCXW	9	11
NSNF	20	66	WDJU	21	42	YJWH2		32

SUMMARY: GRAND TOTAL VIA RADIO 28416 GRAND TOTAL VIA MAIL 58877

U.S. Voluntary Observing Ship Weather Reports

October, November and December 1984

SHIP NAME	VIA RADIO	VIA MAIL
ACADIA	23	16
ADABELLE LYKES	85	225
ADDIRIYAH	24	
ADONIS	42	84
AL AHMADIAH	26	18
ALASKA STANDARD	17	29
ALASKAN	25	54
ALBULA	1	138
ALMERIA LYKES	56	168
ALPINE ROSE	10	57
AMELIA TOPIC	41	
AMERICAN ALTAIR	50	180
AMERICAN APOLLO	32	99
AMERICAN AQUARIUS	68	159
AMERICAN ARGO	37	56
AMERICAN ASTRONAUT	70	115
AMERICAN DRACO	21	104
AMERICAN EAGLE	28	2
AMERICAN ENVOY	49	138
AMERICAN HERITAGE	31	60
AMERICAN LANCER	30	156
AMERICAN LARK	39	200
AMERICAN LEGION	10	195
AMERICAN LIBERTY	41	168
AMERICAN LYNX	111	22
AMERICAN MARKETER	70	223
AMERICAN MERCHANT	91	122
AMERICAN PIONEER	50	162
AMERICAN PURITAN	45	151
AMERICAN RESERVIST	65	187
AMERICAN RESOLUTE	55	130
AMERICAN RIGEL	48	88
AMERICAN SKY	32	70
AMERICAN TITAN AK 1008	53	54
AMERICAN TRADER	48	113
AMERICAN TROJAN	23	
AMERICAN VEGA	44	76
AMERICANA	47	110
AMOCO BALTIMORE	54	60
AMOCO CAIRO	2	
AMOCO YORKTOWN	18	
ANJA LEONHARDT	35	
ANNIE JOHNSON	6	119
AQUA CITY	118	173
AQUARIUS	85	151
ARCHON	42	52
ARCO ALASKA	66	69
ARCO ANCHORAGE	2	
ARCO CALIFORNIA	14	36
ARCO FAIRBANKS	31	55
ARCO INDEPENDENCE	2	61
ARCO JUNEAU	38	33
ARCO PRUDHOE BAY	53	34
ARCO SAG RIVER	24	31
ARCO SPIRIT	25	
ARCO TEXAS	49	62
ARCTIC TOKYO	14	179
ARGONAUT	45	76
ARILD MAERSK	16	45
ARMAND HAMMER	13	78
ARMCO	6	
ARTHUR M ANDERSON	79	40
ASHLEY LYKES	15	48
ASIA INDUSTRY	58	
ASIA NO 14	30	49
ATIGUN PASS	37	132
ATLANTIC RAINBOW	37	119
AUSTANGER	15	55
AXEL JOHNSON	26	12
AXEL MAERSK	1	
B.T. ALASKA	75	254
B.T. SAN DIEGO	85	204
BALLARD		118
BALSA NO 7		35
BALTIMORE TRADER	35	108
BAR' ZAN	41	85
BARBAROSSA	36	85
BARBER TAIF	19	27
BARBER TEXAS	28	35
BARBER TOBA	31	65
BARBER TONSBERG	33	31
BAY BRIDGE	70	60
BAYAMON	74	126
BELO RIO	85	113
BENSON FORD	118	137
BERNINA	27	109
BLUE COSMO	57	130
BOGASARI DUA	7	
BOGASARI LIMA	33	9
BOHEME	88	36
BORINQUEN	61	145
BRIGHT SUN	104	230
BRINTON LYKES	15	41
BROOKS RANGE	28	36
BUNGA MELAWIS	33	32
BURNS HARBOR		137
CAGUAS	1	
CALCITE II	8	
CASON J. CALLAWAY	72	95
CENPAC 2	16	
CHARLES LYKES	65	100
CHARLES M. BEEGHLEY	36	32
CHARLOTTE LYKES	90	206
CHARLOTTE MAERSK	38	76
CHASTINE MAERSK	24	80
CHEMICAL PIONEER	53	74
CHERRY VALLEY	40	65
CHESAPEAKE	38	61
CHESNUT HILL	66	264
CHEVRON ANTWERP	84	98
CHEVRON ARIZONA	47	85
CHEVRON CALIFORNIA	80	92
CHEVRON COLORADO	65	80
CHEVRON COPENHAGEN	4	19
CHEVRON FELUY	45	70
CHEVRON FRANKFURT	28	189
CHEVRON LONDON		94
CHEVRON LOUISIANA	29	35
CHEVRON MISSISSIPPI	77	38
CHEVRON NORTH AMERICA	1	3
CHEVRON OREGON	32	9
CHEVRON PACIFIC		3
CHEVRON WASHINGTON	134	129
CHEYENNE	1	
CHRISTIAN MAERSK	40	91
CITY OF MIDLAND	10	40
CLARA MAERSK	17	43
CLOVER TRUST	36	75
COLUMBIA STAR		102
COLUMBUS AMERICA	164	
COLUMBUS LOUISANA	52	
COMMANCHE	2	9
CONDORA	1	
CONTINENTAL FRIENDSHIP		93
CONTINENTAL HIGHWAY	27	8
COPIAPO		19
CORNUCOPIA	19	50
COVADONGA	22	51
CRYSTAL REED	3	
CRYSTAL STAR	120	186
CYGNUS	93	145
D'ALBERTIS	9	32
D.L. BOWER		60
DA MOSTO	3	62
DACEBANK	112	
DAGLAND	14	48
DAVID D. IRWIN	6	14
DAVID PACKARD		88
DAWN	56	129
DEL ORO		15
DELAWARE TRADER	70	146
DELTA NORTE	3	
DELTA SUD	7	
DINA	31	
DISCOVERER 511		76
DISCOVERER SEVEN SEAS	96	122
DOCTOR LYKES	45	116
DOLLY TURMAN	2	86
DON JUAN	42	72
DON PAFU		37
DRAGOR MAERSK	38	92
DUBHE	44	155
EASTERN BRIDE	54	46
EASTERN DIAMOND	30	108
EASTERN FRIENDSHIP	35	114
EASTERN GLORY	19	98
EASTERN GRACE		134
EASTERN ROYAL	88	50
EASTERN SAGA	23	77
EASTERN VENTURE	31	
EATON GLORIA	74	
EDITA	7	
EDWARD B. GREENE	27	34
EDWARD L. RYERSON	76	94
EDWIN H. GOTT		77
ELIZABETH LYKES	71	139
ERNEST R BREECH	22	29
ESSO KOBE	1	
ESSO PALM BEACH	45	150
EVER GENTRY	1	
EVER GIFTED	32	
EVER GRADE		26
EVER LAUREL	47	130
EVER LEVEL	51	55
EVER LINKING		53
EVER LIVING	4	81
EVER LOADING		32
EVER LYRIC	7	18
EVER SHINE	20	175
EVER SPRING	17	16
EVER SUPERB	111	117
EVER TRUST		75
EVER VALIANT	24	23
EVER VALUE	8	6
EVER VIGOR	2	129
EVER VITAL	25	90
EXPORT CHALLENGER	25	99
EXPORT CHAMPION	37	60
EXPORT FREEDOM	36	148
EXPORT PATRIOT	35	87
EXXON BALTIMORE	2	5
EXXON BATON ROUGE	24	27
EXXON BAYTOWN	30	13
EXXON BOSTON	81	121
EXXON GETTYSBURG		2
EXXON HOUSTON	56	71
EXXON JAMESTOWN	36	26
EXXON LEXINGTON	41	43
EXXON NEW ORLEANS	61	84
EXXON NORTH SLOPE	15	13
EXXON PHILADELPHIA	20	26
EXXON PRINCETON	14	24
EXXON SAN FRANCISCO	20	26
EXXON WASHINGTON	24	39
EXXON WILMINGTON	1	48
EXXON YORKTOWN	12	30
FALSTRIA	110	136
FEDERAL BULKER	7	
FERNCROF	68	78
FESTIVALE	12	5
FETISH	56	150
FJORD STAR	9	13
FORTALEZA	137	198
FRANCIS SINCERE NO 6	26	65
FRASER	3	
FREDERICK LYKES	56	93
FREDERICKSBURG	10	19
FRIENDSHIP	98	
FRISKY	14	
FROTASIRIUS	13	28
GALVESTON	59	126
GAMA ROBUSTA	2	
GEMINI		208
GENEVIEVE LYKES	13	60
GEORGE A. SLOAN	41	50
GEORGE A. STINSON		130
GEORGE WYTHE	1	
GERONIMO		51
GLACIER BAY	55	102
GLOBAL FRONTIER	83	215
GLOBE TRADER	18	20
GOLDEN APO	35	52
GOLDEN DAISY		15
GOLDEN GATE	28	15
GOLDEN GRAMPUS	22	61
GOLDEN HAWK	57	70
GOLDEN PHOENIX	15	34
GOWA	19	
GREAT LAND	41	148
GREAT OCEAN	51	
GREEN FOREST	44	45
GREEN MAYA	75	153
GREEN SAIKAI	8	
GREEN STAR	15	
GREEN WOOD		147
H. LEE SELVY	11	
H. LEE WHITE		162
HAI MONG	29	
HANJIN INCHEON	24	26
HANJIN KWANGYANG		48
HANJIN POHANG	44	11
HARBOUR BRIDGE	115	119
HARDANGER	2	8
HERBERT C. JACKSON	57	
HOEGH CLIPPER	18	36
HOEGH DENE		28
HOEGH DRAKE	46	62
HOEGH MALLARD	27	
HOEGH MARLIN	43	27
HOEGH MASCOT	8	47
HOEGH MIRANDA	25	116
HOMSING ARROW	11	99

SHIP NAME	VIA RADIO	VIA MAIL
HOHSING BREEZE	60	88
HONSHU GLORIA	22	48
HOWELL LYKES	18	
HUAL TRAVELLER	22	
HYUNDAI # 14	7	
HYUNDAI # 21	8	
HYUNDAI # 23	23	21
HYUNDAI ATLANTIC	6	12
HYUNDAI CON # 22	36	104
IMPERIAL		29
INGER	25	111
IRIS ISLAND	37	42
IRVIN L. CLYMER	64	69
ITALICA	32	73
J. LOUIS	18	112
J.A.W. IGLEHART	40	46
J.L. MAUTHE	103	138
J.T. HIGGINS		66
JADRAN	6	
JALAMOKAMBI	4	
JALAVIJAYA	73	
JAMES LYKES	2	
JAPAN APOLLO	93	102
JAPAN RAINBOW	48	67
JEAN LYKES	19	21
JOHN G. MUNSON	58	70
JOHN LYKES	25	36
JOSEPH LYKES	24	37
JUNO	38	54
JUPITER NO 1	46	51
K CHALLENGER		38
KAUAI	79	197
KEIYO	32	32
KENAI	82	226
KENNETH E. HILL		119
KENWOOD	36	71
KEYSTONE CANYON	1	
KEYSTONER	34	107
KNORR	25	32
KOFUKU MARU	34	103
KOREAN AMETHYST	29	
KOREAN FIR	39	12
KOREAN JACEWON	54	123
KOREAN PRIDE	48	
KOREAN WONIS JIN	11	102
KOREAN WONIS ONE	36	41
KOREAN WONIS SEVEN	31	58
KOREAN WONIS SUN	21	
KPPAN	6	
KYOHO MARU	105	
LA MOLINERA	3	
LAKES STAR	2	
LARS MAERSK	25	57
LASH ATLANTICO	35	37
LASH ITALIA	26	101
LASH PACIFICO	34	85
LAURA MAERSK	18	61
LAUST MAERSK	26	91
LAVAUX	64	120
LEDA MAERSK	27	34
LEISE MAERSK	21	28
LESLIE LYKES	17	54
LEWIS WILSON FOY		170
LEXA MAERSK	32	89
LICA MAERSK	16	33
LILLOOET	14	55
LNG TAURUS	30	148
LONG LINES	33	137
LOUIS MAERSK	39	62
LOUISE LYKES	46	58
LUCENT STAR	53	
LUNA MAERSK	22	63
LURLINE	93	228
MAERSK WAVE		132
MALLORY LYKES	60	136
MAMMOTH PINE	32	47
MANHATTAN DUKE	23	
MANUKAI	102	194
MANULANI	72	176
MARATHA SHOGUN	56	39
MARCONA CONVEYOR	110	58
MARDI GRAS	1	2
MARGARET LYKES	87	218
MARGRETHE MAERSK	37	38
MARIA TOPIC	35	
MARITIME NOBLE	67	30
MARJORIE LYKES	3	24
MARLIN	3	
MASON LYKES	29	28
MATARAM	14	
MATHILDE MAERSK	13	37
MAUI	73	197
MAURICIÓ DE OLIVEIRA	3	73
MELBOURNE HIGHWAY		26
MELVILLE	46	136
MEONIA	78	17
MICRONESIAN COMMERCE		131
MING AUTUMN	6	
MING GALAXY	2	45
MING GLORY	21	50
MING MOON	10	66
MING OCEAN	20	44
MING STAR	8	18
MING SUMMER	9	
MING SUN	13	
MING UNIVERSE	10	37
MISSION SANTA CLARA	55	87
MIXTECO	26	57
MOANA PACIFIC	99	220
MOBIL AERO	1	
MOBIL ARCTIC	53	186
MOBIL MERIDIAN	53	125
MOKU PAHU	162	39
MORMACSUN	2	23
MOSMAN STAR		22
MYRON C. TAYLOR	75	102
NACIONAL MONCHIQUE	93	128
NANCY LYKES	4	16
NATIONAL DIGNITY	46	158
NATIONAL HONOR	7	28
NATIONAL PRIDE	7	119
NAVIOS ENTERPRISE	41	127
NEPTUNE ALDEBARAN	26	66
NEPTUNE DIAMOND	49	91
NEPTUNE PEARL	41	87
NEW INDEPENDENCE	62	244
NEWARK	4	55
NICOLA PROSPERITY	18	
NICOLET	48	63
NISSAN MARU	59	30
NOAA DAVID STARR JORDA	28	32
NOAA SHIP ALBATROSS IV	65	169
NOAA SHIP CHAPMAN	76	26
NOAA SHIP DAVIDSON	74	102
NOAA SHIP DELAWARE II	82	129
NOAA SHIP FAIRWEATHER	101	138
NOAA SHIP FERREL	6	10
NOAA SHIP MCARTHUR	57	32
NOAA SHIP MILLER FREEM	66	
NOAA SHIP MT MITCHEL	23	54
NOAA SHIP PIERCE	88	98
NOAA SHIP RAINIER	17	33
NOAA SHIP RESEARCHER	236	249
NOAA SHIP SURVEYOR	78	67
NOAA SHIP WHITING	41	428
NORTHERN HIGHWAY	35	24
NORWAY	50	2
NOSAC SEL		174
OAK PEARL		58
OAK SUN		16
OAKLAND	38	19
OBERON	65	151
OCEAN STEELHEAD	15	
OCEANIC	106	125
OCTA	36	94
OGDEN DYNACHEM	32	95
OLEANDER	57	147
OLGA TOPIC	70	230
OMI WILLAMETTE	2	
OPCO MINER	24	
OPCO TRADER	110	
ORIENTAL EDUCATOR	71	101
ORIENTAL EXECUTIVE	43	91
ORIENTAL EXPLORER	1	135
ORIENTAL GOVERNOR		42
ORIENTAL KNIGHT	12	44
ORIENTAL MINISTER		36
ORIENTAL SOVEREIGN	11	19
ORIENTAL TAIO	19	
OVERSEAS ARCTIC	56	206
OVERSEAS CHICAGO	30	54
OVERSEAS JUNEAU	27	18
OVERSEAS MARILYN	1	
OVERSEAS NATALIE	82	68
OVERSEAS NEW YORK	60	133
OVERSEAS VIVIAN		37
PACBARON	20	
PACBARONESS	1	
PACDUCHESS	25	
PACDUKE	28	24
PACEMPEROR	26	
PACGLORY	10	
PACIFIC ANGEL		50
PACIFIC ARROW	151	62
PACIFIC BRIDGE	9	39
PACIFIC ERA	5	
PACIFIC EXPRESS	8	13
PACIFIC SAGA	8	
PACIFIC SUNSHINE		4
PACIFIC VENTURE	93	76
PACIFIC VICTORY	65	81
PACIFIC WING	64	
PACKING		24
PACLADY	23	12
PACMAJESTY	10	
PACMERCHANT	31	11
PACMONARCH	37	
PACNOBLE	29	
PACSTAR	20	
PALAWAN ISLAND		1
PALLAS	2	
PAN DYNASTY	1	
PAPALLA	44	87
PAUL THAYER		70
PENNSYLANIA RAINBOW	34	
PENNSYLVANIA SUN	11	
PENNSYLVANIA TRADER	31	80
PETERSBURG	5	16
PHILADELPHIA	43	118
PHILIP R CLARKE	66	101
PHOENIX	62	160
PITTSBURGH	93	192
POLAR ALASKA	19	120
POLYNESIA	110	214
PONCE	56	93
PORTLAND	20	16
POTOMAC TRADER	20	35
PRESIDENT CLEVELAND	39	141
PRESIDENT GRANT	89	153
PRESIDENT HOOVER	58	96
PRESIDENT JACKSON	46	
PRESIDENT JEFFERSON	51	170
PRESIDENT JOHNSON	56	184
PRESIDENT KENNEDY	50	17
PRESIDENT LINCOLN	63	138
PRESIDENT MADISON	103	213
PRESIDENT MC KINLEY	38	194
PRESIDENT MONROE	53	97
PRESIDENT PIERCE	67	201
PRESIDENT ROXAS	51	113
PRESIDENT TAFT	19	40
PRESIDENT TAYLOR	43	72
PRESIDENT TYLER	50	134
PRESIDENT WASHINGTON	56	130
PRESIDENT WILSON	67	
PRINCE OF TOKYO	80	217
PRINCE WILLIAM SOUND	11	33
PROSPERIDAD	48	49
PROVINCIA DE EL ORO	4	20
PUNTA BRAVA	33	8
QUATSINO SOUND		65
QUEEN OPAL	72	29
RADIANT VENTURE	13	
RAINBOW HOPE	3	20
RAPID	51	130
RED ARROW	146	31
REGENT CEDAR	47	
REGINA MAERSK	32	81
RICHARD		121
RIGOLETTO	16	35
ROACHBANK	167	
ROBERT D. CONRAD	6	170
ROBERT E. LEE	28	33
RODRIGUES CABRILHO	34	67
ROSE	1	20
ROSINA TOPIC		44
ROVER	9	131
ROYAL SAPPHIRE	13	54
ROYAL VIKING SEA	1	
ROYAL VIKING SKY	23	25
RUTH LYKES	17	
S.T. CRAPO	58	57
SACRAMENTO	36	37
SAINT LOUIS	59	183
SALVADOR	16	45
SAM HOUSTON	28	
SAMUEL S	45	23
SAN JUAN	97	136
SAN PEDRO	1	
SANKO ANTARES		16
SANKO CYCLAMAN		15
SANKO DAFFODIL		53
SANKO ETERNITY		10
SANKO HEART		51
SANKO IRIS	21	75
SANKO LAPIS		165
SANKO MAPLE	8	
SANKO ROBIN		132
SANKO STAR		52
SANKO VENUS		59
SANSIMENA II	2	4
SANTA FE	20	
SANTA JUANA	109	218
SANTA MAGDALENA	4	3
SAUDI MAKKAH	51	
SAUDI RIYADH	53	35
SAVONITA	46	142
SEA ASTRA	20	16
SEA BELLS		45
SEA DIAMOND		75
SEA EXPORTER	26	

SHIP NAME	VIA RADIO	VIA MAIL
SEA FAN		105
SEA FORTUNE		149
SEA JADE	71	63
SEA LANTERN	29	
SEA LIGHT		147
SEA WORLD	11	47
SEABULK CHALLENGER	2	
SEALAND ADVENTURER	78	183
SEALAND CONSUMER	69	123
SEALAND DEFENDER	73	144
SEALAND DEVELOPER	59	177
SEALAND ECONOMY	62	188
SEALAND ENDURANCE	66	109
SEALAND EXPLORER	53	173
SEALAND EXPRESS	69	176
SEALAND FREEDOM	88	197
SEALAND INDEPENDENCE	87	146
SEALAND INNOVATOR	79	163
SEALAND LEADER	60	183
SEALAND LIBERATOR	34	133
SEALAND MARINER	62	179
SEALAND RACER	23	100
SEALAND PATRIOT	63	194
SEALAND PIONEER	33	179
SEALAND PRODUCER	61	204
SEALAND VENTURE	60	158
SEALAND VOYAGER	75	177
SENATOR	2	
SEVEN OCEAN	48	36
SHELDON LYKES	63	108
SHIRLEY LYKES	17	62
SIDNEY FOSS		107
SINCERE NO. 5	1	
SKANDERBORG	7	
SKAUGRAN	81	154
SKODSBORG	5	6
SKOUBORG	64	203
SOHIO RESOLUTE	93	165
SOLON TURMAN	8	38
SOUTH LIGHT	5	
SOUTHERN ACCORD		89
SOUTHWEST CAPE	5	
SOVEREIGN VENTURE	13	39
SPARROWS POINT	13	22
SPIRIT OF LIBERTY	59	104
SPRING BALLAD	50	
SPRING BIRD	40	53
SPRING BLOSSOM	62	82
SPRING BREEZE		338
ST. CLAIR		6
STAR CARRIER	21	26
STAR DIEPPE	34	
STAR DOVER	24	
STAR EAGLE	45	
STAR ENTERPRISE	29	27
STAR HONGKONG	19	24
STAR INDONESIA		78
STAR KANDA	19	35
STAR LUZON	15	32
STAR PHILLIPPINES	4	
STAR SINGAPORE	18	86
STAR THAILAND	33	
STARWARD	29	
STEADFAST	7	49
STELLA LYKES	35	36
STEWART J. CORT		74
STONEWALL JACKSON	25	37
STREAM HAWSER	66	48
SUGAR ISLANDER	74	122
SUN VIKING	19	38
SUNBELT DIXIE	138	158
SYLVO	38	52
TARASCO	63	99
TENCHBANK	115	
TEXACO GEORGIA	1	
TEXACO RHODE ISLAND	10	8
TEXAS TRADER	42	204
TFL DEMOCRACY	39	179
TFL ENTERPRISE	46	132
TFL EXPRESS	51	159
TFL FRANKLIN	31	
TFL FREEDOM	28	141
TFL INDEPENDENCE	5	71
TFL JEFFERSON	42	95
TFL LIBERTY	42	96
THAMES	10	11
THOMAS G. THOMPSON	174	251
THOMAS WASHINGTON	95	102
THOMPSON LYKES	12	108
THOMPSON PASS	31	
TILLIE LYKES	44	102
TOKYO RAINBOW	60	31
TONCI TOPIC	23	
TONSONIA	30	108
TOWER BRIDGE	105	60
TOYOTA #24	144	75
TRANSCOLUMBIA	27	
TRANSINDIANA	3	
TRITON	24	79
TROPIC SUN	33	75
TROPICALE		4
TYSON LYKES	67	163
ULTRAMAR	15	42
UNICORN	8	82
USCGC ALERT (WMEC 630)	22	
USCGC BASSWOOD (WLB 38	37	28
USCGC CHEROKEE WMEC 16	1	18
USCGC CHILULA (WMEC 15	4	143
USCGC CITRUS (WMEC 300	24	
USCGC CLOVER (WMEC 292	40	
USCGC COURAGEOUS	14	
USCGC DEPENDABLE	3	
USCGC DURABLE (WMEC 62	12	
USCGC GLACIER (WAGB 4)	84	84
USCGC HAMILTON WMEC 71	8	
USCGC INGHAM (WMEC 35)	3	
USCGC IRONWOOD (WLB 29	5	
USCGC JARVIS (WMEC 725		200
USCGC LAUREL (WLB 291)	15	36
USCGC MELLON (WMEC 717	20	
USCGC MESQUITE (WLB 30	9	
USCGC MIDGETT (WMEC 72	3	
USCGC MUNRO (WMEC 724)		76
USCGC NORTHWIND WAGB 2	38	32
USCGC POLAR SEA WAGB 1	34	86
USCGC POLAR STAR WAGB	117	84
USCGC RED CEDAR WLM 68		8
USCGC RESOLUTE WMEC 62	48	
USCGC SEDGE (WLB 402)	13	
USCGC SHERMAN (WMEC 72	37	
USCGC SUNDEW (WLB 404)	18	30
USCGC SWEETBRIER WLB 4	5	
USCGC TAMAROA (WMEC 16	5	11
USCGC TANEY (WHEC 37)	3	
USCGC VALIANT (WMEC 62	3	
USCGC YOCONA (WMEC 168	2	12
USNS BARTLETT	56	98
USNS DE STEIGUER	6	
USNS HARKNESS TAGS 32	19	
USNS KANE TAGS 27		154
USNS LYNCH T-AGOR 7	99	179
USNS METEOR T-AKR 9	48	
USNS MISSISSINEWA		89
USNS MOHAWK	46	23
USNS PASSUMPSIC TAO 10		73
USNS PIGEL TAF 58		124
USNS SEALIFT ANTARCTIC	9	
USNS SEALIFT ARABIAN S	23	151
USNS SEALIFT CHINA SEA	62	44
USNS SEALIFT INDIAN OCE	1	
USNS SEALIFT MED	8	22
USNS SEALIFT PACIFIC	31	
USNS TRUCKEE TAO-147		128
USNS VANGUARD TAG 194	40	62
USNS WACCAMAW(TAO-109)		154
USNS YUKON T-AO 152	30	
VALLEY FORGE	49	85
VALOR	20	
VAN CONQUEROR	59	150
VAN HAWK	81	40
VELMA LYKES	36	99
VENTURE STAR		57
VISHVA PRAFULLA	3	
WALCHAND	24	
WALTER RICE	71	209
WASHINGTON RAINBOW #2		22
WASHINGTON TRADER	97	268
WECOMA	127	154
WESTERN SUN	7	4
WESTWARD VENTURE	41	13
WESTWOOD MERIT		8
WILLIAM A. POESCH		57
WILLIAM CLAY FORD	110	85
WILLIAM E. MUSSMAN	55	160
WILLIAM J. DELANCEY		61
WOLVERINE		136
WORLD CANDOUR	55	
WORLD PRORITY	13	
YAMASHIN MARU	175	70
ZEPHUNTER	86	166
ZFUS	34	128
ZOELLA LYKES	37	42
3EBA		8
3EGC2		62
3EHN2		79
3EKN3		3
3ESG2		37
3EUD2		18
3FFU2		71
3FGY2		14
3FGZ2		65
3FHY2		2
3FIG2		62
3FJI2		65
3FUM		40
3FVF2		22
5LCP		61
5LFT		32
5LKL	15	29
5LOT		24
5LOZ	17	13
5LUS	45	246
5MGH		16
6ZTO	6	20
6ZZH		14
7LDN	12	24
9MYJ	28	76
9VUG	13	46
9VUVT		38
9VYW		25
A8DD	45	105
A8IJ		175
AAIV		25
ATJV	16	24
ATKF	6	29
ATLC	47	129
ATUT	21	22
BHFJ	23	24
BKHZ		39
C6FAJ		87
C6FAT		101
C6FG		5
C8AC	3	16
D5D7	44	192
D5JV	1	11
D9CJ		38
D9CT		16
D9JL		1
D9OA	8	19
DUCE	24	56
DUKY	7	38
DVWZ		26
DZBR	34	80
DZJC	23	46
DZMK	1	
EAFC	20	79
EDCB		4
EFMU		6
ELAJ4		7
ELAK2		68
ELBM4		61
ELBY6		14
ELCF2		92
ELDU4		131
ELDV5		185
ELOC	4	7
ELTO5		112
GYEV	52	72
H3GX	17	
H3XV	17	56
H8J0	33	66
H8JV	8	16
H8MH	1	11
H8OE	1	41
H8Y0	7	10
H9D0		11
H9KJ	8	57
HDJI	13	29
HPRL	2	87
HPZ0	12	31
HSAF	28	43
JCUF	49	34
JFHT	52	16
JGAZ		26
JKXH	24	25
JMGK	41	30
J7RV		19
K3DR		12
KAAI	33	59
KADP	32	
KCBK	19	18
KCKO		59
KCVE		23
KGDJ		12
KGPK	9	13
KGYE	21	76
KHAS	11	33
KKLA	32	61
KLCH		2
KLHG		52
KNCS	28	58
KPFP		24
KPGO		40
KPIC		12
KPKL	41	61
KPCJ	53	107
KRDB	22	187
KRHG	38	76
KPHX	29	33
KRJF	16	37
KRJG	81	164

Continued on page 118.

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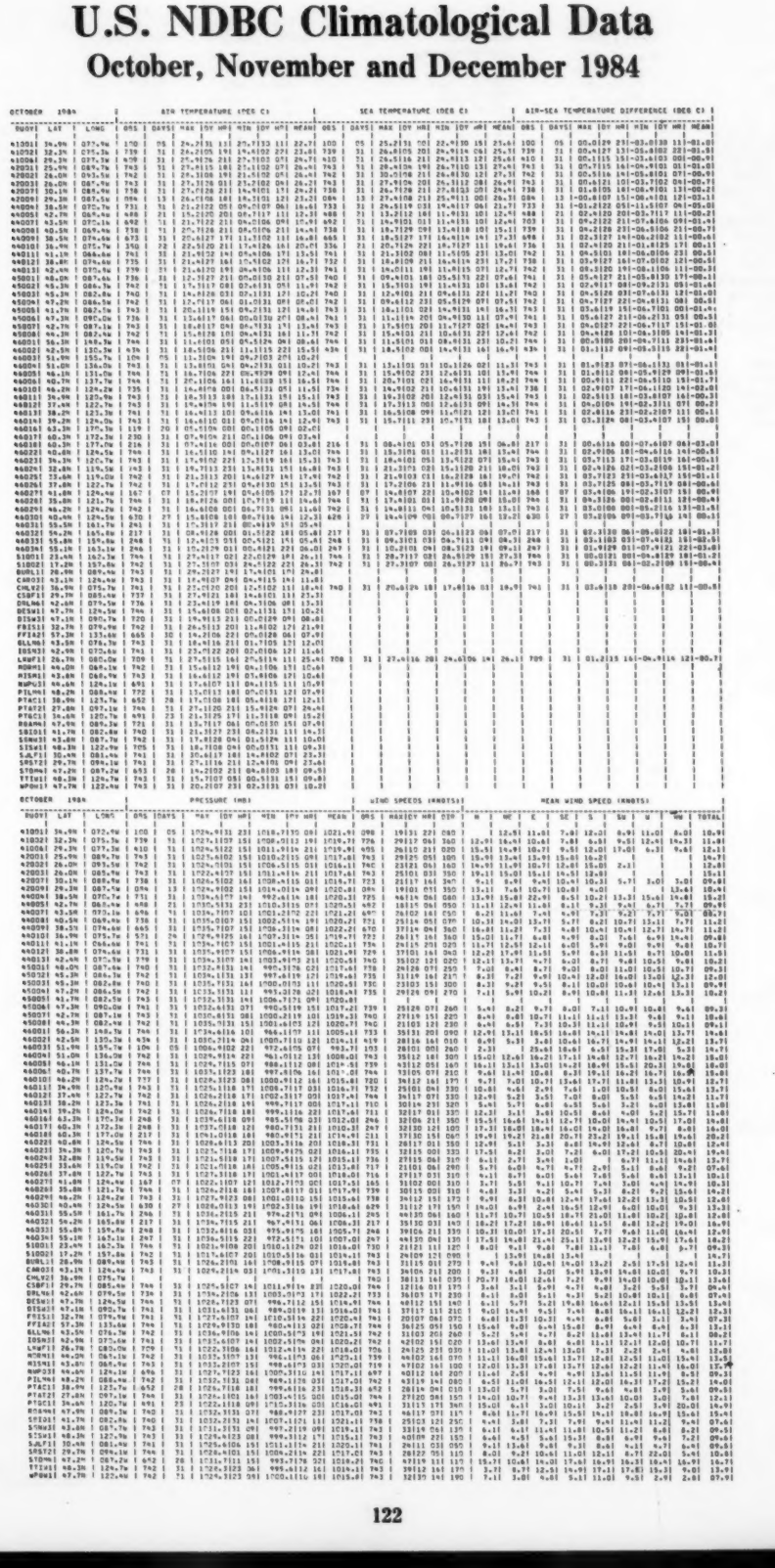

OCTOBER 1984

WAVE HEIGHTS (METERS)

BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN
41001	34.9N	072.9W	998	1.5	27	21	1.1
41002	32.3N	075.3W	162	3.5	07	16	1.5
41006	29.3N	077.3W	407	5.0	11	00	2.0
42001	25.9N	089.7W	741	2.0	01	00	1.1
42002	26.0N	093.5W	739	2.5	16	20	1.1
42003	26.0N	085.9W	743	2.5	25	19	1.1
42007	30.1N	088.9W	696	1.0	01	07	0.5
44005	42.7N	068.9W	688	4.5	17	07	1.5
44007	43.5N	070.1W	583	5.0	02	19	1.0
44008	40.5N	069.4W	710	4.0	14	08	1.0
44010	36.9N	075.7W	727	3.5	13	15	1.1
44011	41.1N	066.6W	736	5.5	18	08	2.0
45001	48.0N	087.6W	691	5.0	25	10	1.3
45002	45.3N	086.3W	433	4.5	19	21	1.3
45003	45.3N	082.8W	588	3.0	03	16	1.0
45004	47.2N	086.5W	635	5.0	26	10	1.1
45005	41.7N	082.4W	514	2.0	06	03	0.7
45006	47.3N	090.0W	655	3.5	17	14	1.0
45007	42.7N	087.1W	702	3.0	19	16	0.9
45008	44.3N	082.4W	607	3.0	03	19	1.0
46001	56.3N	148.1W	742	9.0	31	21	2.8
46002	51.0N	131.0W	462	6.5	09	14	2.1
46003	46.1N	131.0W	739	10.5	12	18	3.1
46006	40.7N	137.7W	744	7.5	10	01	2.7
46010	46.2N	124.2W	707	8.5	13	07	2.5
46011	34.9N	127.9W	743	5.0	15	20	1.2
46012	37.4N	122.7W	728	9.0	17	08	2.0
46013	38.2N	123.3W	731	5.0	17	07	2.2
46014	39.2N	124.0W	741	4.5	10	20	2.3
46022	34.3N	120.7W	741	5.0	15	08	2.0
46024	32.8N	119.5W	741	5.0	15	13	2.2
46025	33.6N	119.0W	741	2.5	01	04	1.3
46026	37.8N	122.7W	740	3.5	17	05	1.6
46028	35.8N	121.7W	744	5.5	15	09	2.4
46029	46.2N	124.2W	740	8.5	13	06	2.6
51002	17.2N	157.8W	740	3.5	09	13	2.1
CARI3	43.1N	124.4W	173	0.0	00	00	0.0
CHLV2	36.9N	075.7W	674	3.5	13	16	1.0

FREQUENCY OF WAVE HEIGHTS (%)

BUOY	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001		0.0						
41002		38.2	37.6	6.7				
41006		50.8	30.7	9.8	8.5			
42001	8.0	86.6	5.2					
42002		63.5	14.7					
42003	21.6	61.0	9.6					
42007	15.3							
44005	85.8	19.1						
44007	15.7	54.5	15.3	13.1	1.2			
44008	14.7	37.9	12.6	1.7	1.5			
44010	30.6	47.6	17.3	13.0	6.7	0.4		
44011	53.3	31.4	12.2	3.7				
45001	8.8	41.4	21.4	16.7	11.5			
45002	28.6	49.0	15.3	4.3	2.6			
45003	30.9	44.1	18.0	5.3	1.6			
45004	32.8	57.3	8.1	1.7				
45005	48.6	38.8	10.8	1.3	0.7			
45006	66.1	33.4	0.5					
45007	39.0	48.0	8.5	4.2				
45008	45.1	46.5	8.2					
46001	57.6	9.7	9.1					
46002	19.8	42.8	16.4	15.9	4.0	0.9		
46003		20.1	16.2	38.7	17.3	1.0		
46006		22.8	29.9	11.7	29.0	4.4	1.2	0.6
46010	6.8	33.4	21.9	23.7	17.5	1.8	0.4	
46011	0.6	37.6	35.6	19.3	6.5			
46012	0.1	42.7	40.1	12.5	4.5			
46013		33.2	39.3	21.0	6.2			
46014		33.6	38.2	22.6	5.5			
46022		27.9	39.0	24.8	9.2			
46024		32.1	41.7	20.6	5.5			
46025	4.8	75.3	19.8					
46026	1.4	58.5	32.7	7.2				
46028		29.3	36.2	22.5	11.8			
46029	0.6	33.2	22.0	29.1	17.8	1.3	0.6	
51002		17.9	71.6	10.4				
CARI3								30.0
CHLV2	47.3	40.2	8.4	4.8				

OCTOBER 1984

TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT
41001	34.9N	072.9W		2.0	48.0	50.0			
41002	32.3N	075.2W		0.8	43.0	38.3	9.9		
41006	29.3N	077.3W		2.7	40.5	50.4	6.4		
42001	25.9N	089.7W		0.1	13.1	54.8	2.0		
42002	26.0N	093.5W		1.5	31.6	45.3	21.5		
42003	26.0N	085.9W			12.0	58.3	1.7		
42007	30.1N	088.9W		7.3	46.7	45.9			
44005	42.7N	068.9W		2.4	46.4	51.2			
44007	43.5N	070.1W		4.0	51.6	44.1	12.0	6.3	
44008	40.5N	069.4W		4.6	50.2	45.2			
44010	36.9N	075.7W		11.9	55.2	31.9	1.0		
44011	41.1N	066.6W		9.2	39.0	45.2	6.7		
45001	48.0N	087.6W	3.6	7.5	46.6	41.0	4.8	1.2	
45002	45.3N	086.3W		9.4	52.9	37.9	1.8		
45003	45.3N	082.8W		8.3	41.3	48.9	1.5		
45004	47.2N	086.5W	6.3	7.0	47.6	37.2	4.6	1.6	
45005	41.7N	082.4W	4.5	10.8	49.7	34.5	4.9	0.1	
45007	42.7N	087.8W		6.8	54.6	34.2	4.4	0.5	
45008	44.3N	082.4W		5.3	48.4	42.3	4.0		
46001	56.3N	148.1W		4.5	22.1	58.7	14.5	0.3	
46002	42.5N	130.3W		6.4	22.2	59.9	11.5		
46003	51.9N	131.0W		3.0	22.4	57.1	14.6		
46006	51.0N	136.0W		2.3	24.1	56.1	17.4	0.1	
46005	46.1N	131.0W		2.8	17.3	47.5	28.0	4.3	
46006	40.7N	137.7W		3.0	32.4	51.3	13.3		
46010	46.2N	124.2W		4.7	34.9	51.0	9.3	0.1	
46011	34.9N	127.9W		4.6	27.9	63.0	4.5		
46012	37.4N	122.7W		9.7	44.2	33.9	12.1	0.1	
46013	38.2N	123.3W		15.8	35.4	41.0	7.9		
46014	39.2N	124.0W		12.1	36.7	39.8	11.4		
46016	53.3N	177.3W		3.4	27.6	51.6	18.3		
46017	60.3N	172.7W		2.4	31.1	49.4	27.1		
46018	60.3N	177.0W			7.6	50.2	40.3	1.9	
46022	40.8N	124.5W		6.8	39.5	37.7	5.9		
46023	34.3N	120.7W		0.7	11.2	44.9	43.3		
46024	32.6N	117.5W		2.2	25.4	61.8	8.6		
46025	33.6N	119.0W		16.9	58.9	24.3			
46026	37.8N	122.7W		14.0	42.5	39.2	4.3		
46027	41.8N	124.4W	5.5	9.7	45.5	38.8	6.1		
46028	35.8N	121.7W		5.0	73.7	20.8	10.6		
46029	46.2N	124.2W		5.7	34.0	50.4	9.8	0.1	
46030	40.4N	124.5W	3.3	3.6	29.6	47.6	9.1		
46031	55.5N	161.7W		6.9	30.2	54.3	6.5	2.0	
46032	54.2N	164.1W			26.3	53.8	29.0	2.9	
46033	55.8N	159.9W		0.6	43.2	43.5	10.5	2.4	
46034	55.1N	163.1W			16.2	52.2	28.3	3.2	
51001	23.4N	162.3W		8.2	53.2	29.6			
51002	17.2N	157.8W			8.6	49.6	1.7		
BURL1	28.9N	089.4W	0.7	3.9	39.7	55.2	1.2		
CARI3	43.1N	124.4W	4.0	17.0	40.1	34.9	7.7	0.3	
CHLV2	36.9N	075.7W	1.9	5.8	12.0	47.4	13.9	0.8	
CSBF1	29.7N	095.0W	7.3	36.2	42.5	1.2			
DRLN1	42.6N	077.9W	5.9	22.2	54.3	16.9	2.2	0.4	
DPIA1	47.7N	124.5W	3.0	12.6	36.4	30.4	15.9	4.8	0.1
DISW1	47.1N	090.7W	0.9	6.3	44.7	36.4	10.8	1.8	
FBIS1	32.7N	079.9W	1.5	21.9	55.5	22.7			
FFIA2I	57.3N	133.6W	3.6	9.7	32.7	40.7	10.0	3.9	
GLL41	43.5N	276.7W	5.3	23.7	49.2	15.7	3.9		
IOSN3	42.9N	070.6W	2.8	8.5	36.1	40.7	9.3	1.5	
LKWI1	26.7N	087.7W	0.6	8.7	25.1	49.1	1.1		
MPRN1	44.2N	066.1W	1.1	4.3	32.1	52.0	10.4	1.2	
NIS41	44.8N	069.9W		3.7	30.4	53.4	9.3	3.4	
NWP01	44.6N	124.1W	4.4	20.8	39.0	16.0	3.7	0.3	
PTLW1	48.2N	087.4W	1.3	6.6	32.1	44.9	13.9	2.6	
PTAC1I	38.9N	123.7W	6.0	17.8	41.3	37.0	4.0		
PTAI2I	27.8N	097.1W	0.5	3.1	25.1	58.1	3.4		
PTGC1I	34.6N	120.7W	2.6	4.3	21.4	45.4	18.9		
ROAN4	47.9N	089.1W	1.7	9.2	26.9	45.8	17.0	0.1	
SRIO1I	41.7N	082.8W	3.8	24.0	49.5	24.9	1.6		
STNW3I	43.8N	087.7W	3.9	14.8	47.6	32.2	0.4		
STSW1I	48.3N	122.9W	6.5	22.6	42.1	26.0	2.9	1.3	
SJLF1I	30.4N	081.4W	2.3	10.8	50.9	38.1	1.1		
SPST2I	29.7N	094.1W	0.8	4.3	44.8	49.0	1.9		
STDM4I	47.2N	087.2W	0.9	3.9	18.5	52.6	22.0	2.0	
TTIW1I	48.3N	124.7W	1.7	8.7	33.2	41.0	10.3	1.7	
WPOW1I	47.7N	124.4W	7.4	26.6	44.7	20.0	2.7		

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	N	NE	E	SE	S	SW	W	NW
41001		1.0	11.2	18.5	57.7	17.6	1.0	1.0
41002	0.2	22.2	15.8	13.7	10.7	0.3	6.3	10.8
41006	7.8	31.2	45.0	8.8	0.2	0.2	1.9	5.2
42001	2.7	19.0	36.4	31.7	10.1			
42002	1.0	3.6	21.9	50.5	22.9	0.3		
42003	4.3	24.7	47.9	19.8	3.4			
42007	5.5	13.0	15.6	46.8	16.4	1.7	0.2	0.8
44005	13.4	19.9	46.8	19.2	1.2			1.5
44007	15.7	28.2	19.6	5.2	3.5	13.1	11.2	12.4
44008	17.4	15.6	13.1	6.4	6.5	10.4	11.5	11.1
44010	17.5	15.9	7.9	3.6	9.9	22.0	12.3	11.0
44011	16.9	18.7	13.7	4.6	7.1	16.4	12.3	10.2
45001	17.3	22.6	10.3	9.7	16.0	21.6	3.5	2.9
45002	14.3	24.0	13.8	7.2	20.3	10.7	3.3	6.5
45003	19.8	20.5	11.2	2.6	2.8	14.9	17.7	11.3
45004	4.7	18.2	25.3	18.0	14.8	19.0	3.7	4.3
45005	16.1	16.3	6.3	7.2	10.8	18.5	12.2	12.4
45007	9.5	9.3	15.5	24.5	16.6	14.4	5.4	5.4
45008	4.7	9.8	15.4	14.8	18.9	25.4	13.0	5.7
46001	4.1	5.8	16.6	16.5	19.2	15.7	11.4	10.7
46002	4.2	4.6	19.8	25.9	15.9	13.2	10.0	6.6
46003	1.2	13.6	19.2	13.4	11.8	20.0	17.1	3.7
46006	13.6	11.1	13.0	13.1	13.0	16.4	11.6	8.1
46010	9.0	9.8	9.7	11.2	8.2	11.4	14.5	26.3
46011	8.1	1.2	0.7	3.8	23.3	15.5	25.8	21.6
46012	4.7		0.4	7.5	9.6	35.9	34.5	7.0
46013	4.1	5.8	16.6	16.5	19.2	15.7	11.4	10.7
46014	9.3	6.1	9.3	13.4	19.7	12.5	20.0	10.6
46015	11.1	1.8	1.4	6.7	18.9	17.9	22.0	20.2
46016	4.8	4.2	2.8	3.6	11.9	23.4	33.6	15.9
46017	1.0	3.3	10.4	8.5	23.4	11.6	10.6	12.9
46018	19.0	3.1	1.7	1.7	8.1	1.4	2.3	70.7
46022	20.4	1.2	1.3	7.5	10.0	3.8	6.3	45.4
46023	2.8	0.5	4.3	7.8	6.5	3.8	9.6	63.0
46024	14.7	1.2	0.4	16.4	16.3	3.2	3.1	43.7
46025	6.9	28.0	10.0	10.3	4.7	8.9	5.4	4.2
46026	32.0	19.1	8.1	12.6	4.0	9.8	2.4	11.9
46027	36.8	19.1	12.1	12.3	8.2	2.8	2.6	12.1
46028	45.2	2.6	1.6	8.7	28.3	7.5	1.8	4.2
46029	21.3	0.6	0.3	0.7	0.1	0.6	1.4	74.4
46030	3.7	1.0	0.4	0.1		0.3	10.1	84.3
46031	5.5	6.6	5.2	3.7	3.7	6.4	43.3	25.7
46032	1.6	0.8	2.3	3.9	10.7	8.1	26.2	46.3
46033	3.8	3.6	27.9	27.1	2.8	7.1	7.1	27.3
46034	1.6	0.7	0.9	0.8	0.4	2.4	11.7	81.5
51001	10.5	5.2	19.6	4.7	24.9	11.3	10.9	10.9
51002	43.6	8.3	1.5	24.2	15.4	0.8	0.5	5.9
BURL1	24.2	10.4	2.1	11.7	8.9	3.3	10.4	28.8
CARI3	16.2	4.8	12.4	19.4	3.0	8.4	18.0	28.3
CHLV2	16.3	32.1	11.3	3.7	1.1	6.1	9.4	20.9
CSBF1	20.5	15.6	6.9	15.9	2.6	1.7	16.9	17.8
DRLN1	4.6	20.4	28.5	16.7	22.7	3.2	2.0	2.0
DPIA1		3.4	91.5	3.1				
DISW1	10.8	18.3	34.7	30.6	2.3	0.3	0.3	2.7
FBIS1	18.6	9.1	8.0	10.7	36.3	11.5	4.5	1.1
FFIA2I	9.7	14.8	20.7	8.4	10.5	18.1	10.9	7.7
GLL41	7.7	24.7	19.4	24.1	14.4	4.5	3.8	2.2
IOSN3	10.6	15.3	10.5	15.4	14.1	14.5	8.3	7.8
LKWI1	5.5	10.6	14.9	32.1	11.4	4.5	8.2	12.9
MPRN1	2.1	25.1	13.2	12.7	15.2	22.3	7.3	2.2
NIS41	10.6	18.6	15.1	6.1	16.8	17.5	6.1	9.1
NWP01	22.4	12.5	7.4	13.9	5.3	5.8	8.0	24.7
PTLW1	9.4	26.1	11.8	6.2	14.3	8.2	15.1	9.1
PTAC1I	16.0	16.1	6.0	6.4	11.5	10.0	17.8	12.1
PTAI2I	7.6	33.8	40.3	9.2	1.4	2.4	1.7	4.0
PTGC1I	13.6	17.2	10.8	5.0	5.7	20.4	14.0	13.3
ROAN4	13.2	12.9	15.4	5.8	6.0	17.5	17.4	13.7
SRIO1I	8.8	3.5	29.5	5.4	27.6	14.1	11.4	4.6
STNW3I	5.9	8.6	21.8	15.9	15.7	17.1	11.1	3.9
STSW1I	42.1	15.3	4.7	9.4	17.9	2.6	2.0	6.1
SJLF1I	9.6	9.7	21.1	32.3	8.9	4.05	1.7	3.0
SPST2I	80.3	2.6	0.2	0.8	2.4	8.7	0.4	12.7
STDM4I	4.9	15.8	15.4	12.3	13.4	19.0	14.0	5.1
TTIW1I	14.8	15.6	10.4	12.7	12.2	11.5	8.3	6.5
WPOW1I	16.1	9.5	10.6	12.9	18.7	14.5	15.0	4.4
	9.6	8.2	8.1	27.5	13.4	8.4	15.8	9.7
	6.4	28.7	16.5	20.6	10.5	5.7	0.2	6.3
	9.7	18.2	8.3	43.1	28.9	2.8	0.1	9.8
	3.8	4.7	6.9	25.2	24.9	10.7	15.3	8.4
	1.8	8.9	34.4	12.7	18.8	9.8	14.2	2.2
	18.5	14.8	2.4	13.9	39.9	6.8	1.3	0.4

OCTOBER 1984			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW		NW
41001	34.9N	072.9W					1.8	0.3				0.5	5.6	9.4	19.4	12.3		1.0		0.5	5.6	1.0	36.5	5.4	1.0	
41002	32.3N	075.3W	0.6	1.4	1.4	1.2	1.9	0.7	0.6	1.0	4.4	3.1	7.5	9.6	8.0	5.7	1.6	3.1	0.7	13.1	6.9	2.0	8.6	1.9	4.0	0.1
41006	29.3N	077.3W	0.4	0.9	0.7	0.5				0.2	1.0	6.5	24.6	4.7			1.2	2.5	4.6	19.2	19.8	3.6	[illegible]	0.2	0.2	2.5
42001	25.9N	089.7W				0.1					0.3	2.5	5.7	3.3	1.2				2.4	16.5	30.6	26.7	8.5			
42002	26.0N	093.5W				0.6	0.6	0.3				1.0	15.1	15.7	5.0				1.0	2.4	11.8	33.8	16.4			
42003	26.0N	085.9W										2.7	4.4	2.3	0.6				3.5	21.5	43.0	17.5	2.8			
42007	30.1N	088.9W	0.6	1.2	1.1	1.4	1.1	1.0	0.2	0.6	3.0	7.6	7.2	21.9	6.4	0.5		0.2	1.8	4.1	7.3	23.[illegible]	8.0	0.3		6.0
42009	29.3N	087.5W		1.5	0.9						1.8	14.9	72.9	5.7	1.2				11.6	3.6	25.0	9.5				1.5
44004	38.5N	070.7W	0.7	1.2	0.5	<.05	0.6	0.2	0.3	0.6	6.3	8.2	2.3	2.2	3.4	3.7	1.8	3.7	6.3	13.7	3.1	1.0	1.1	8.1	7.2	5.6
44005	42.7N	068.4W	0.2	0.6	0.2	0.4	0.6	1.4	0.7	0.4	6.6	3.0	3.0	4.6	3.5	10.3	10.7	8.6	10.5	11.9	10.0	1.4	2.4	6.7	0.2	2.1
44007	43.5N	070.1W	2.2	0.6	1.4	1.2	1.6	1.6	1.6	1.5	9.5	7.1	4.9	2.2	5.4	12.2	8.3	5.4	5.7	7.1	1.6	0.2	2.6	8.2	2.5	4.1
44008	40.5N	069.4W	1.6	1.6	0.5	1.6	1.2	1.3	0.6	0.9	7.6	4.1	3.8	2.4	3.2	5.7	4.2	8.1	7.5	9.3	7.3	0.6	2.8	9.4	7.2	1.1
44009	38.5N	074.6W	0.1	0.4	0.8	0.9	1.5	1.2	0.3	0.3	5.6	11.3	8.4	4.9	6.9	8.1	0.6	0.1	7.0	10.0	1.1		7.6	10.2	2.7	2.5
44010	36.9N	075.7W	1.0	1.1	1.1	2.4	1.7	1.0	0.8	0.4	2.2	7.5	12.1	4.6	13.8	7.6	1.8	1.2	9.3	15.4	0.6	[illegible]	4.8	2.1	0.6	4.9
44011	41.1N	066.6W	1.4	0.9	0.4	0.6	0.4	0.6	1.8	2.7	6.9	6.1	3.6	1.3	1.5	8.9	9.4	3.5	10.8	12.7	7.2	0.7	0.1	5.4	6.5	5.6
44012	38.8N	074.6W	0.3	0.4	0.3	1.3	1.8	0.4	1.3	1.2	1.7	5.9	13.1	0.6	0.5	8.2	0.9	0.7	2.6	5.8	10.3	0.1	4.5	10.3	1.4	2.2
44013	42.4N	070.8W	1.8	0.3	1.5	1.4	0.9	1.8	1.9	1.2	6.3	6.6	4.7	5.3	6.5	8.2	5.6	6.7	6.7	7.6	0.1	0.5	3.4	8.5	3.3	4.3
45001	48.0N	087.6W	0.2	0.3	0.8	1.0	2.1	0.8	0.9	0.6	2.1	3.6	6.0	15.9	11.7	6.9	6.4	2.0	0.3	1.4	3.6	9.6	4.7	8.9	6.3	3.2
45002	45.3N	086.3W	0.1	1.0	1.4	0.8	1.0	0.7	0.3	<.05	3.4	7.6	7.3	7.6	4.3	3.3	4.8	2.3	0.8	1.3	6.2	6.3	4.0	18.0	7.5	3.4
45003	45.3N	082.8W	0.8	0.6	1.7	2.6	2.9	1.4	0.7	1.0	1.9	3.1	7.6	8.9	5.7	5.8	5.0	3.0	1.4	2.1	7.3	5.0	10.6	8.4	8.5	[illegible]
45004	47.2N	086.5W	0.3	0.7	1.3	2.5	0.9	1.6	0.2	0.6	3.1	3.3	10.0	14.8	7.2	3.6	3.0	1.6	0.7	0.5	7.7	8.[illegible]	7.7	7.9	6.0	4.3
45006	47.3N	090.0W	0.5	0.7	0.6	0.7	1.1	0.7	1.0	0.4	0.6	9.6	10.8	9.9	9.6	9.0	6.9	1.6	0.1	3.9	7.7	[illegible]	1.1	9.9	8.1	1.7
45007	42.7N	087.1W	0.5	0.6	0.9	0.6	0.5	0.2	0.7	1.0	3.9	5.4	10.6	9.3	6.4	3.2	3.7	6.1	1.3	2.2	9.5	9.4	8.3	7.5	3.9	2.6
45008	44.3N	082.4W	3.1	2.7	1.8	1.0	0.9	0.7	1.2	1.9	7.7	6.8	[illegible]	4.9	3.9	7.7	5.6	2.4	2.7	1.6	3.2	7.2	8.2	8.0	4.7	3.9
46001	56.3N	148.3W	0.6	0.7	0.3	0.1	0.3	0.7	0.6	1.0	2.5	2.0	1.9	2.1	2.0	3.2	2.5	5.8	4.9	7.1	3.7	6.3	4.7	4.9	11.0	16.1
46002	42.5N	130.3W	1.1	0.2	0.2	0.7	0.5	0.1	1.0	2.6	4.4	0.9	0.4	1.1	2.6	3.5	4.4	5.0	1.9	0.1		1.6	15.5	9.7	10.6	12.6
46003	51.9N	155.7W	1.5				1.0	1.0		0.5	0.7				7.8	5.7	4.9	6.6				6.1	0.7	27.9	22.6	
46004	51.0N	136.0W	0.2	0.3	0.2	0.1	0.5	0.3	0.5	0.2	2.6	1.6	1.1	1.3	5.0	5.9	3.2	3.5	4.9	1.7	2.7	9.1	10.0	4.5	11.9	11.2
46005	46.1N	131.0W	0.4	0.3	0.4	0.6	0.1	0.4	0.2	0.4	1.5	0.6	0.1	2.5	3.3	5.0	2.9	1.3	6.7	0.5	0.9	2.3	8.4	7.9	9.6	11.2
46006	40.7N	137.7W	0.4	0.1	0.4	0.7	0.1	0.2	0.8	0.3	2.4	1.7	0.9	1.4	1.9	5.4	5.3	3.4	1.8	2.4	1.4	1.2	4.8	11.8	19.6	0.3
46010	46.2N	124.2W	0.8	0.5	0.5	0.6	0.4	0.7	0.5	0.8	4.6	3.2	8.9	3.2	2.6	4.0	3.0	5.1	5.0	0.7	9.1	2.9	13.6	6.8	6.2	6.9
46011	34.9N	120.9W	1.0	1.3	1.3	0.2	0.1	0.4	0.3	0.2	7.5	1.7	0.4	1.1		0.3	1.7	10.4	10.6	0.1		0.4		0.7	0.4	32.6
46012	37.4N	122.7W	1.2	0.3	0.7	0.8	1.6	1.1	1.7	2.2	10.0	0.9	0.6	5.4	5.8	2.5	4.0	15.0	9.8			1.2	2.2	<.05	0.3	20.3
46013	38.2N	123.3W	1.2	0.3	1.3	1.8	3.1	2.2	2.6	3.3	1.1	<.05	1.9	4.5	2.2	1.5	5.8	10.2	0.5	0.2	1.1	1.3	1.1	<.05	1.2	35.6
46014	39.2N	124.0W	1.7	0.6	2.4	1.9	1.5	1.3	1.3	1.4	4.9	0.6	1.9	6.5	10.6	1.9	1.4	9.0	5.6		0.1	8.0	4.1		0.4	21.6
46016	63.3N	170.3W	0.7	0.4	0.8			0.4		0.1	6.0	5.7	3.9	3.3	2.1	1.4	3.5	1.8	16.2	14.7	3.3	6.2	2.5	6.4	1.9	0.4
46017	60.3N	172.3W	1.1					0.4		0.9	3.5	2.0	2.1	2.6	0.6	1.1	1.6	7.4	17.9	9.8	2.5	[illegible]	2.8	[illegible]	0.8	3.6
46018	60.3N	177.0W									1.3	1.5	1.4	0.9	0.5	0.1	0.8	0.9	16.1	12.7	2.8	[illegible]	2.6	1.7	1.3	7.1
46022	40.8N	124.5W	1.4	0.8	1.1	1.4	1.1	0.7		0.3	11.0	1.7	0.5	3.8	5.1	2.1	1.3	4.1	25.7	0.1		3.4	18.5	4.7	0.5	4.7
46023	34.3N	120.7W	0.3		0.1	0.1				0.1	3.0	0.6	0.1	0.3	0.1	<.05	0.9	5.3	10.1			0.3		0.5	0.6	33.4
46024	32.8N	119.5W	1.0	0.6	0.2	0.1		0.1	1.2	0.9	2.4	0.4	0.1			0.1	3.3	19.0	0.3					0.1	5.4	56.0
46025	33.6N	119.0W	1.5	2.1	1.6	0.8	2.6	2.2	3.9	2.1	3.8	3.7	3.6	2.9	0.9	3.7	26.1	14.1	0.2	0.7				0.5	13.2	9.6
46026	37.8N	122.7W	1.2	0.2	1.0	1.6	1.8	2.3	3.2	2.6	0.1	0.2	0.7	2.1	6.0	5.4	14.3	13.7	0.2	0.4	0.6	0.2	2.7	0.5	0.6	26.0
46027	41.8N	124.4W	2.4		1.8	2.7	0.9	0.6		1.2	0.9	3.6	16.4	0.5		0.6	6.7	8.8	0.5		9.7	15.9	1.1		0.5	11.2
46028	35.8N	121.7W	0.4	0.4	0.4	0.1	0.3	0.7	1.6	1.0	1.1	0.2	0.5	0.6	0.1	0.9	5.9	14.5	0.1			<.05	0.1	0.8	4.2	55.5
46029	46.2N	124.2W	0.7	0.3	0.9	0.6	0.8	0.4	0.7	1.2	4.9	3.4	0.3	2.9	3.3	3.6	3.0	4.6	4.9	1.5	10.4	2.0	13.6	7.2	5.9	5.0
46030	40.4N	124.5W	0.5	1.2	0.8	0.2	0.7	0.2	0.1	0.2	10.8	5.4	0.8	5.7	3.5	0.5	0.2	2.8	29.5	1.7		12.6	11.1	0.1	0.2	2.3
46031	55.5N	161.7W	1.0	1.2		0.8		0.4	1.0	2.4	10.4	3.5	1.5	0.4	0.4	0.5	4.0	9.5	10.7	5.7	0.8	7.1	6.5	1.9	5.4	16.0
46032	54.2N	165.8W									3.5	1.0	2.1	5.0	2.0	3.1	7.5	2.2	6.6	2.1	5.2	6.3	0.7	1.2	0.2	13.4
46033	55.8N	159.8W			0.4						12.2	23.5	3.3	1.3	1.1	4.2	2.5	5.0	2.7	7.2	4.3	0.6		1.9	1.6	15.1
46034	55.1N	163.1W									3.5	5.1	1.4	0.4	1.2	0.5	2.3	1.7	11.2	8.2	1.9	4.4	1.1	1.2	12.3	11.8
51001	23.4N	162.3W	0.5	1.4	1.0	1.7	2.2	0.9	0.5	0.2	2.8	13.3	16.7	10.9	5.7	1.1	1.1	1.6	1.2	5.8	10.0	4.1	14.9	1.3	0.4	0.1
51002	17.2N	157.8W										0.6	7.2	0.8						4.7	82.7	2.3				
BURL1	28.9N	089.4W	0.4	0.4	1.1	1.7	0.4	0.3		0.3	5.9	9.9	17.1	5.9	0.3		0.1	0.5	4.5	8.0	16.5	22.6	1.7			1.9
CARO3	43.1N	124.4W	3.1	3.9	4.6	2.5	1.6	0.2	0.5	0.6	7.9	4.6	3.5	7.9	10.6	2.9	1.5	1.1	7.2	0.6		0.3	16.6	6.3	2.5	1.4
CHLV2	36.9N	075.7W	0.2	0.8	0.8	0.6	0.9	0.6	1.5	0.4	0.9	2.1	7.1	7.3	5.9	3.6	4.1	0.9	2.7	9.9	11.8	0.5	3.2	12.6	5.4	1.3
CSBF1	29.7N	085.4W	4.2	15.6	2.6	7.2	2.0	2.6	1.0	1.1	3.5	9.1	16.5	16.6	11.9	1.9	1.9	1.1			0.3	0.2	0.5		0.1	
DBLN6	42.6N	079.5W	2.0	3.5	2.7	6.1	4.0	7.3	1.2	1.5	5.3	7.1	7.6	8.6	11.7	6.7	3.7	3.6	3.3	4.7	0.2	0.7	0.8	6.5	2.9	0.9
DESW1	47.7N	124.5W	2.3	2.9	2.8	0.8	1.5	1.0	0.6	0.5	2.0	7.2	11.6	4.1	3.8	2.3	1.5	3.9	1.2	0.4	0.6	13.5	1.6	1.5	4.5	7.2
DISW3	47.1N	090.7W	0.2	0.4	1.9	1.1	1.0	0.5	0.2	0.4	1.1	9.1	6.5	10.[illegible]	9.8	6.0	1.7	0.5	0.7	9.7	4.1	1.6	3.9	11.2	4.1	1.1
FRIS1	32.7N	079.9W	2.7	0.7	1.2	2.7	1.9	2.6	4.0	6.0	6.2	6.2	6.3	3.5	13.2	14.8	2.1	3.1	1.6	11.6	7.7		1.7	0.1		
FFIA2	57.3N	133.6W	1.3	1.9	1.8	1.8	1.4	0.6	0.2	0.7	9.9	4.7	3.8	5.4	5.5	0.7	0.5	2.1	12.4	3.4	1.7	19.8	2.5	0.4	0.4	0.1
GLLN6	43.5N	076.3W	3.8	5.9	3.8	1.0	0.8	0.6	2.4	3.0	4.5	10.7	7.6	3.2	5.0	2.3	4.8	3.1	1.0	1.5	0.3	1.8	8.0	4.0	6.7	2.4
IOSN3	42.9N	070.6W	1.2	0.8	0.6	1.7	0.6	0.8	1.6	1.1	5.0	4.5	3.1	3.1	4.6	3.6	6.1	6.1	7.5	9.5	2.3	1.5	6.3	9.4	8.1	3.9
LKWF1	26.7N	080.0W	0.4	0.6	0.5	0.2	0.1	1.9	1.3	0.5	3.1	6.2	9.3	1.1	1.0	0.4	0.4	3.5	4.1	25.5	30.4	8.0	0.2			
MDRM1	44.0N	068.1W	0.9	0.7		0.1	0.3	0.4	1.5	0.3	5.6	1.9	3.8	1.9	1.8	5.6	6.3	5.2	6.3	11.6	5.8	2.7	3.6	14.0	5.8	3.0
MISM1	43.8N	068.9W	1.0	0.3	0.1	<.05	0.6	1.3	0.9	0.5	4.5	4.0	2.1	1.8	1.6	5.8	7.3	3.7	4.6	7.8	9.6	3.5	3.8	10.0	8.6	5.6
MWPO3	44.6N	124.1W	0.4	2.8	10.0	1.9	1.3	1.9	1.1	1.4	3.0	0.7	17.9	3.4	6.1	3.1	3.6	1.3	5.4		1.6	0.1	13.3	8.3	5.6	1.7
PILM4	48.2N	088.4W	0.6	0.6	1.0	0.9	1.2	1.3	0.5	0.5	4.9	4.1	6.3	5.7	6.0	2.2	2.2	0.8	0.4	3.5	9.1	0.1	7.2	9.3	5.7	1.5
PTAC1	38.9N	123.7W	2.1	4.8	3.3	1.3	1.9	1.2	0.5	3.1	13.0	7.7	1.8	6.8	8.1	1.0	0.4	2.6	23.0	2.8		1.3	7.9	0.4	0.1	1.4
PTAT2	27.8N	097.1W	0.1	0.6	0.9	<.05			1.1	0.3	2.3	2.3	12.8	13.7	2.2	<.05	0.5	1.7	7.0	2.0	7.5	36.1	4.5		0.1	0.9
PTGC1	34.6N	120.7W	1.9	0.7	0.2	0.1	0.6	0.5	0.2	0.3	15.9	1.6		0.4	1.9	0.2	0.2	1.3	50.7	0.2		0.4				4.1
ROAM4	47.9N	089.3W	1.1	0.6	0.8	0.5	0.7	0.8	0.4	0.3	2.0	7.1	4.0	1.8	4.3	4.3	2.5	0.9	1.4	6.6	6.6	8.1	6.2	6.4	7.5	3.8
SBIO1	41.7N	082.8W	5.2	8.0	2.7	2.0	2.3	1.7	1.2	0.8	9.5	7.2	12.1	7.2	4.5	3.3	2.6	3.2	0.1	0.4	3.6	3.5	5.1	6.0	4.8	2.2
SGNW3	43.8N	087.7W	2.8	1.3	2.4	1.8	3.2	0.9	1.2	1.2	11.9	3.4	2.4	5.3	6.0	6.4	9.0	3.1	1.4	0.7	4.6	3.0	8.8	5.9	4.7	2.3
SISW1	48.3N	122.9W	2.8	3.7	1.9	2.1	2.9	2.9	4.1	2.2	4.9	3.7	6.0	8.4	5.6	3.4	4.1	6.0	1.9	0.8	0.2	9.5	4.6	2.0	5.9	1.2
SJLF1	30.4N	081.4W	0.6	0.5	0.1	1.6	0.3	2.3	2.4	2.1	3.6	6.7	9.5	11.6	7.0	3.4	5.8	3.3	2.2	17.4	6.9	7.4	3.3			0.9
SRST2	29.7N	094.1W	1.1	0.6	0.4	0.7	1.2	0.3		0.1	3.3	6.5	4.3	10.3	10.2	1.4		0.8	1.3	3.0	3.2	23.4	17.0	1.1		
STDM4	47.2N	087.2W	0.2	0.4	0.5	0.8	0.4	1.0	0.1	0.4	1.4	1.7	2.5	4.0	2.7	2.3	2.6	1.5	1.1	2.6	3.1	13.2	16.2	4.2	0.5	3.6
TTIW1	48.3N	124.7W	1.1	0.8	1.9	0.3	0.5	0.4	0.2	0.3	0.4	5.6	13.1	2.0	4.2	3.1	3.7	1.2	0.2	2.4	14.3	0.7	5.1	2.7	7.1	0.6
WPOW1	47.7N	122.4W	4.6	4.4	0.8	5.6	4.2	1.0	0.8	0.3	9.6	5.0	1.6	7.3	16.3	4.3	0.5	0.1	4.3	0.4		1.1	16.8	3.4		

OCTOBER 1984			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W																								
41002	32.3N	075.3W	2.5	4.6					0.1	2.7																
41006	29.3N	077.3W	1.9	4.6																						
42001	25.9N	089.7W			0.1	1.5	0.3																			
42002	26.0N	093.5W				0.4	1.0																			
42003	26.0N	085.9W	0.8	0.4	0.5																					
42007	30.1N	088.9W																								
42009	29.3N	087.5W																								
44004	38.5N	070.7W	1.6	3.2	1.1		0.4	1.1	2.0	2.5	0.8	2.0	3.6													
44005	42.7N	068.4W																								
44007	43.5N	070.1W		1.0																						
44008	40.5N	069.4W	0.3	3.8	2.1				0.3	0.1																
44009	38.5N	074.6W	3.4	0.9				0.1			1.2	<.05														
44010	36.9N	075.7W	1.0							<.05																
44011	41.1N	066.6W	0.6	0.9																						
44012	38.8N	074.6W	0.1	4.4	1.7			0.1	0.1	0.1		1.6														
44013	42.4N	070.8W	1.3	1.9				<.05	1.4	0.4	0.1	<.05														
45001	48.0N	087.6W						0.1	0.5																	
45002	45.3N	086.3W			0.5	0.1	1.6	3.4	1.3																	
45003	45.3N	082.8W							0.2	1.7																
45004	47.2N	086.5W			0.9	0.3			0.8	0.1																
45006	47.3N	090.0W			0.1			0.4	1.1																	
45007	42.7N	087.1W			0.4	0.7		0.7																		
45008	44.3N	082.4W																								
46001	56.3N	148.3W	0.8		3.4	2.7	1.2	2.6	0.3	3.4			0.3													
46002	42.5N	130.3W	0.7			0.5	4.7	2.2	1.9	1.4																
46003	51.9N	155.7W			3.4	1.5		1.7	7.0																	
46004	51.0N	136.0W	1.6	0.5	1.3	3.0	3.2	1.7	4.4	1.5								0.1								
46005	46.1N	131.0W	2.5	0.5		0.9	6.4	4.1	6.6	7.0				0.4	0.7	0.3	2.6	0.3								
46006	40.7N	137.7W	0.1			<.05	5.1	6.0	9.0	3.9																
46010	46.2N	124.2W				1.8	6.5	0.1	0.8	0.1					0.1											
46011	34.9N	120.9W								7.5																
46012	37.4N	122.7W	3.4			<.05	0.4	0.2	0.3	7.8								0.1								
46013	38.2N	123.3W								7.9																
46014	39.2N	124.0W	2.5				0.1			8.8																
46016	63.3N	170.3W	6.0	7.2	2.0	0.8		0.4		1.8																
46017	60.3N	172.3W	9.4	7.3	3.4	3.0	0.6	3.3																		
46018	60.3N	177.0W	13.4	3.8	7.5	5.5	4.6	1.1	0.5	4.0		1.1	0.4		0.5											
46022	40.8N	124.5W	2.2			0.1	3.5	<.05		<.05																
46023	34.3N	120.7W	7.7							35.6																
46024	32.8N	119.5W							0.2	0.4																
46025	33.6N	119.0W																								
46026	37.8N	122.7W				0.1	0.2		0.1	3.9																
46027	41.8N	124.4W								6.1																
46028	35.8N	121.7W							0.1	10.5																
46029	46.2N	124.2W				1.2	7.0	0.1	1.2	0.2					0.1											
46030	40.4N	124.5W	3.0	0.1		5.8	0.1			0.1																
46031	55.5N	161.7W	2.0			2.7	0.6	0.4		0.8				0.7	1.3											
46032	54.2N	165.8W	6.0	1.2	5.2	7.1	0.5		0.3	0.8				0.9												
46033	55.8N	159.8W	1.4	1.4	2.0	1.4			0.3	3.9			1.2	0.4				0.8								
46034	55.1N	163.1W	5.8	2.3	5.3	8.2	0.3		2.2	4.3			0.3	2.9												
51001	23.4N	162.3W																								
51002	17.2N	157.8W		0.1	1.7																					
BURL1	28.9N	089.4W				1.1			0.1																	
CARO3	43.1N	124.4W	0.4				5.2	2.1							0.2	<.05										
CHLV2	36.9N	075.7W	5.7	5.3	1.0		0.5	1.4		<.05	0.2	0.6														
CSBF1	29.7N	085.4W																								
DBLN6	42.6N	079.5W						0.7	0.4	1.0						0.3	0.1									
DESW1	47.7N	124.5W				9.2	3.1	1.7	1.6	1.2				3.3	1.5											
DISW3	47.1N	090.7W			4.7	0.7		0.5	3.7	1.0	0.2		0.8				0.9	0.3									
FRIS1	32.7N	079.9W																								
FFIA2	57.3N	133.6W	0.1	0.5		6.0	0.5			0.1	0.8			0.1				<.05								
GLLN6	43.5N	076.3W				0.2	0.5	1.4	1.3	0.6																
IOSN3	42.9N	070.6W	1.6	0.7				0.2	2.0	0.7	0.7	0.6						0.1								
LKWF1	26.7N	080.0W		1.0	0.1																					
MDRM1	44.0N	068.1W	0.7	2.5	0.6	0.3		0.3	1.3	4.8		0.5	0.7													
MISM1	43.8N	068.9W	1.1	0.9	2.2	0.5		0.4	0.7	3.6	0.1	<.05	1.5					0.3								
MWPO3	44.6N	124.1W					1.8	0.8	1.0	0.2					0.2	0.1										
PILM4	48.2N	088.4W		0.1	4.1	1.2	1.1	4.0	2.1	1.2		0.2	1.2		0.1	0.4	0.6									
PTAC1	38.9N	123.7W	4.0																							
PTAT2	27.8N	097.1W	0.2	0.4		2.5	0.2																			
PTGC1	34.6N	120.7W	11.9							7.1																
ROAM4	47.9N	089.3W	0.4	1.5	2.5	1.6	2.2	5.1	3.0	0.6			1.5	0.3		2.3	0.6	0.3								
SBIO1	41.7N	082.8W					0.3	0.5	0.5	0.3																
SGNW3	43.8N	087.7W			1.1	2.0	0.7	1.5	0.1																	
SISW1	48.3N	122.9W				6.2	0.3	0.2	0.9	0.4				1.3												
SJLF1	30.4N	081.4W		1.1																						
SRST2	29.7N	094.1W		0.1	0.3	0.8	0.5		0.1																	
STDM4	47.2N	087.2W	1.0		0.2	6.5	5.5	2.9	3.1	2.7	0.1		0.5	0.7	0.1	0.3	1.1	0.1								
TTIW1	48.3N	124.7W		0.2	5.1	1.7	5.6	2.6	3.0	0.1					0.5	1.1	0.1									
WPOW1	47.7N	122.4W					2.5	0.2																		

NOVEMBER 1984			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	715	30	23.3	05 04	10.1	13 19	18.0	716	30	23.5	01 04	20.0	29 11	22.1	718	30	00.5	05 04	-12.1	13 19	-04.1
41002	32.3N	075.3W	717	30	25.1	05 14	14.7	13 19	20.4	717	30	26.0	02 10	22.6	29 07	24.0	717	30	00.2	19 19	-09.4	13 19	-03.7
41006	29.3N	077.3W	719	30	26.0	04 15	17.6	14 03	22.3	720	30	26.2	02 20	23.4	29 12	24.6	720	30	00.9	19 13	-06.4	22 21	-02.4
42001	25.9N	089.7W	717	30	27.9	04 21	17.8	28 18	23.2	717	30	28.5	04 21	24.1	29 01	25.7	717	30	00.5	18 19	-06.4	28 10	-02.5
42002	26.0N	093.5W	717	30	27.2	01 22	17.0	22 01	23.0	717	30	27.4	04 21	24.6	29 06	26.0	717	30	00.3	18 21	-08.3	22 01	-03.0
42003	26.0N	085.9W	716	30	26.6	01 01	21.0	22 19	24.2	716	30	28.0	03 20	23.7	23 06	25.9	716	30	01.4	27 05	-05.7	13 10	-01.7
42007	30.1N	088.9W	718	30	25.8	01 17	04.0	22 15	16.7	718	30	25.6	01 23	15.7	23 17	19.7	718	30	04.2	27 17	-11.5	12 12	-03.1
44004	38.5N	070.7W	126	06	21.6	05 11	11.5	04 03	16.6	127	06	26.1	05 05	20.0	01 23	23.7	127	06	-01.9	02 11	-12.9	04 00	-07.1
44005	42.7N	068.4W	717	30	15.5	02 15	00.9	20 04	08.1	720	30	12.4	01 05	08.5	25 11	10.3	720	30	03.4	[illegible] 16	-09.8	20 06	-02.2
44007	43.5N	070.1W	385	19	13.7	02 13	00.1	19 12	07.6	391	20	11.5	01 01	10.2	16 02	10.8	411	20	02.3	02 13	-10.2	19 12	-03.3
44008	40.5N	069.4W	693	30	18.4	02 18	00.9	20 14	10.0	694	30	15.6	03 04	10.1	26 01	12.9	697	30	03.5	02 17	-11.7	20 17	-02.8
44009	38.5N	074.6W	340	15	18.7	02 15	05.0	13 17	12.6	639	30	18.7	14 19	11.2	27 00	14.1	690	30	02.8	27 00	-09.9	13 13	-00.9
44010	36.9N	075.7W	188	08	20.9	02 18	05.6	07 16	15.3	188	08	19.6	02 10	16.4	08 20	18.1	189	08	01.4	05 05	-08.4	07 16	-02.8
44011	41.1N	066.6W	719	30	17.0	05 22	02.7	21 09	13.2	719	30	14.7	28 07	08.9	29 09	11.1	719	30	07.2	29 15	-08.2	20 14	-00.9
44012	38.8N	074.6W	712	30	18.3	02 15	00.0	20 10	10.2	710	30	17.2	01 01	10.9	25 08	13.7	716	30	04.7	27 20	-12.0	20 10	-03.5
44013	42.4N	070.8W	686	30	17.5	02 14	00.0	21 02	07.5	716	30	12.5	01 01	07.4	29 10	09.9	717	30	06.9	26 21	-09.5	14 03	-02.0
45001	48.0N	087.6W	249	14	07.0	08 05	00.1	12 14	03.9	467	20	05.8	01 13	04.3	19 14	04.9	460	20	01.6	08 05	-05.2	01 10	-02.5
45002	45.3N	086.3W	602	28	12.8	01 13	00.0	21 16	05.7	707	30	11.7	01 06	08.0	29 01	09.5	700	30	02.9	26 23	-10.8	02 04	-04.5
45003	45.3N	082.8W	534	25	12.5	01 18	00.0	02 08	05.1	664	28	09.7	01 02	05.1	28 10	06.9	665	28	03.6	28 04	-09.0	02 08	-02.7
45004	47.2N	086.5W	295	11	07.4	08 02	00.0	06 23	03.9	302	13	06.0	01 10	03.1	13 15	05.0	302	13	02.7	08 02	-05.6	01 20	-02.2
45005	41.7N	082.5W	678	30	19.0	01 17	00.0	20 19	06.6	718	30	14.9	01 01	05.8	30 12	09.7	718	30	06.8	28 01	-12.2	02 17	-03.4
45006	47.3N	090.0W	260	16	08.7	08 00	00.0	03 04	03.8	475	20	05.5	01 02	04.4	19 15	06.9	476	20	03.5	08 00	-05.3	05 19	-02.6
45007	42.7N	087.1W	457	20	13.8	01 11	00.0	02 23	06.2	477	20	11.7	01 03	07.6	11 10	09.5	477	20	02.6	10 01	-11.4	02 23	-03.6
45008	44.3N	082.4W	577	26	13.2	01 16	00.0	19 03	05.7	666	28	10.6	01 01	06.2	25 04	08.0	667	28	04.2	28 03	-09.8	02 13	-03.0
46001	56.3N	148.3W	716	30	07.9	20 18	01.0	26 06	05.6	716	30	08.0	01 01	06.9	27 20	08.0	716	30	00.0	20 18	-06.3	26 06	-02.2
46002	42.5N	130.3W	138	17	16.1	02 04	10.4	09 13	13.2	138	17	15.1	02 10	13.9	16 16	14.2	138	17	01.2	02 04	-03.6	09 13	-01.0
46004	51.0N	136.0W	191	26	11.3	22 12	04.3	24 03	08.3	191	26	10.2	01 04	09.6	26 03	09.3	192	26	02.4	22 12	-04.6	08 12	-01.0
46005	46.1N	131.0W	715	30	13.3	02 08	06.2	25 09	10.1	715	30	12.7	01 01	10.7	30 05	11.6	716	30	01.5	22 19	-04.8	25 08	-01.4
46006	40.7N	137.7W	717	30	18.1	02 00	07.3	24 11	13.0	717	30	17.1	02 08	14.0	29 10	15.6	717	30	01.7	22 21	-08.3	11 10	-02.5
46010	46.2N	124.2W	694	30	13.9	02 11	04.6	24 14	10.0	694	30	12.9	02 08	09.3	29 10	11.8	698	30	01.3	02 11	-06.5	25 19	-01.8
46011	34.9N	120.9W	718	30	16.9	04 22	10.7	21 17	13.8	718	30	16.0	06 21	13.3	01 03	14.5	718	30	01.8	04 22	-03.6	21 17	-00.8
46012	37.4N	122.7W	714	30	15.9	05 09	11.1	01 13	13.6	716	30	14.9	17 08	12.0	03 12	13.4	716	30	03.2	05 09	-02.8	20 14	[illegible]
46013	38.2N	123.3W	713	30	14.2	02 21	08.6	26 17	12.3	712	30	13.5	13 23	11.1	01 05	12.6	714	30	02.9	02 21	-03.9	26 17	-00.2
46014	39.2N	124.0W	716	30	15.3	16 22	07.2	26 11	12.1	716	30	16.3	16 22	10.8	01 08	12.6	716	30	03.0	02 10	-04.7	26 11	-00.6
46016	63.3N	170.3W	020	05	01.0	04 03	00.1	04 09	00.5														
46017	60.3N	172.3W	159	25	06.1	02 21	00.1	19 06	02.3														
46018	60.3N	177.0W	133	22	05.7	02 21	00.0	06 12	03.1	072	11	04.9	28 21	02.9	25 10	03.4	072	11	-01.2	27 15	-03.4	20 10	-02.5
46022	40.8N	124.5W	715	30	14.9	05 23	06.9	26 12	11.0	715	30	13.7	02 22	10.7	01 18	12.5	715	30	02.9	05 23	-04.0	26 19	[illegible]
46023	34.3N	120.7W	716	30	17.7	01 18	11.0	26 15	14.1	716	30	16.6	01 21	13.3	29 14	15.1	716	30	01.7	01 18	-03.1	26 15	-00.9
46024	32.8N	119.5W	714	30	17.4	13 22	10.6	22 01	14.9	714	30	16.9	01 21	14.5	29 13	15.6	714	30	01.1	13 22	-05.0	22 01	-00.7
46025	33.6N	119.0W	715	30	18.2	19 21	11.3	22 19	15.1	715	30	17.9	12 20	14.6	27 11	16.1	715	30	01.0	02 16	-05.8	22 19	-01.0
46026	37.8N	122.7W	697	30	14.6	05 07	08.2	26 19	12.5	696	30	13.9	16 21	12.0	03 12	12.9	704	30	02.1	03 00	-04.6	26 15	-00.5
46028	35.8N	121.7W	716	30	15.8	13 23	10.9	25 17	13.6	716	30	15.4	11 00	13.3	04 12	14.3	716	30	01.9	13 18	-03.7	28 20	-00.7
46029	46.2N	124.2W	712	30	13.8	02 11	05.3	25 19	10.2	712	30	12.6	02 14	09.6	30 20	11.6	713	30	01.4	02 11	-05.6	25 19	-01.4
46030	40.4N	124.5W	714	30	14.4	16 07	07.9	26 15	11.6	712	30	13.2	12 19	09.7	02 04	11.7	714	30	03.6	05 20	-05.3	20 03	-00.1
46031	55.5N	161.7W	228	30	08.5	01 06	00.1	23 21	04.0														
46032	54.2N	165.8W	206	30	07.7	13 12	00.2	23 21	04.3	209	30	06.9	01 03	05.3	29 12	06.3	209	30	01.2	13 12	-05.9	23 21	-02.0
46033	55.8N	159.8W	224	30	09.7	04 00	00.2	24 00	04.0	236	30	07.9	01 03	03.2	26 12	06.2	239	30	03.0	04 00	-06.1	24 00	-02.4
46034	55.1N	163.1W	239	30	09.0	13 19	00.0	25 07	04.4	238	30	08.3	01 04	05.5	27 13	07.2	240	30	01.5	13 19	-06.7	25 07	-02.9
51001	23.4N	162.3W	695	30	26.8	01 03	21.7	27 05	25.2	695	30	27.3	01 01	25.6	27 15	26.3	717	30	00.1	10 20	-04.0	26 07	-01.1
51002	17.2N	157.8W	714	30	26.6	01 02	22.7	12 16	25.6	714	30	26.6	01 01	25.5	23 16	26.1	715	30	00.3	23 21	-03.5	12 16	-00.5
51003	19.2N	160.8W	715	30	27.2	01 03	22.1	14 09	26.0	715	30	27.3	01 01	26.4	26 22	26.9	715	30	00.0	20 20	-04.9	14 08	-00.9
51004	17.5N	152.5W	536	23	25.9	13 00	22.3	09 13	25.0	536	23	26.2	14 01	25.6	10 14	25.9	536	23	-00.1	13 00	-03.5	09 13	-00.9
ALSN6	40.5N	073.8W	073	04	14.2	28 21	04.3	30 12	09.4	073	04	11.4	29 22	09.3	28 08	10.4	074	04	04.1	28 21	-06.4	30 12	-01.0
BURL1	28.9N	089.4W	712	30	27.3	01 18	04.2	28 17	17.9														
CARO3	43.1N	124.4W	712	30	15.8	27 13	02.5	26 12	10.2														
CHLV2	36.9N	075.7W	710	30	21.0	02 18	01.0	28 14	11.4	710	30	19.4	02 19	11.4	30 12	14.0	713	30	03.4	28 22	-12.8	28 14	-03.4
CLKN7	34.6N	079.8W	504	24	20.9	19 17	01.4	21 12	12.0														
CSBF1	29.7N	085.4W	641	30	25.8	01 19	00.2	14 12	16.4														
DBLN6	42.6N	079.5W	613	29	20.3	01 18	00.0	03 07	06.8														
DESW1	47.7N	124.5W	691	30	12.4	17 18	03.2	30 14	08.4														
DISW3	47.1N	090.7W	423	24	10.2	27 01	00.0	05 23	03.6														
DSLN7	35.2N	075.3W	361	16	22.2	19 07	05.3	28 18	14.2	362	16	24.5	27 03	13.4	24 07	20.3	362	16	00.8	19 19	-13.7	29 10	-06.1
FBIS1	32.7N	079.9W	711	30	25.0	02 17	02.8	29 12	13.4														
FFIA2	57.3N	133.6W	598	29	08.9	22 16	00.0	01 00	03.5														
FPSN7	33.5N	077.6W	679	29	24.2	19 09	06.7	21 08	15.9	679	29	24.0	02 19	15.5	30 12	20.9	680	29	02.0	27 14	-14.5	21 08	-05.0
GLLN6	43.5N	076.3W	624	30	15.3	02 04	00.0	07 10	06.2														
IOSN3	42.9N	070.6W	671	30	16.3	02 14	00.0	18 06	06.8														
LKWF1	26.7N	080.0W	717	30	28.5	04 19	10.1	13 12	22.4	719	30	27.5	05 22	21.1	25 10	24.0	719	30	02.4	24 19	-14.4	13 10	-02.5
MDRM1	44.0N	068.1W	688	30	14.0	02 15	00.0	28 14	07.0														
MISM1	43.8N	068.9W	690	30	13.4	02 14	00.0	18 06	06.8														
NWPO3	44.6N	124.1W	622	30	14.0	16 21	02.5	26 09	09.2														
PILM4	48.2N	088.4W	451	22	07.6	08 03	00.0	05 09	03.7														
PTAC1	38.9N	123.7W	714	30	14.7	11 06	03.2	26 00	11.1														
PTAT2	27.8N	097.1W	714	30	26.1	01 18	07.5	22 13	19.3														
PTGC1	34.6N	120.7W	649	28	17.6	04 19	07.9	26 14	13.3														
ROAM4	47.9N	089.3W	439	23	07.5	26 04	00.0	03 04	03.6														
SBIO1	41.7N	082.8W	645	29	19.7	01 17	00.0	12 06	06.1														
SGNW3	43.8N	087.7W	540	28	13.8	08 20	00.0	02 02	04.8														
STSW1	48.3N	122.9W	393	17	10.9	23 05	02.9	27 09	06.9														
SJLF1	30.4N	081.4W	720	30	27.2	19 19	04.3	13 12	16.5														
SRST2	29.7N	094.1W	710	30	26.0	01 18	03.4	22 10	16.2														
TTIW1	48.3N	124.7W	714	30	11.8	02 17	01.8	01 06	07.9														
WPOW1	47.7N	122.4W	715	30	13.0	12 22	02.3	27 08	08.1														

NOVEMBER 1984			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	716	30	1030.2	27 15	1005.6	06 08	1018.7	714	36	14 01	290	18.1	18.0	13.2	13.3	18.7	20.3	18.6	19.9	17.8
41002	32.3N	075.3W	717	30	1030.0	15 15	1007.5	25 20	1018.9	711	29	23 05	060	15.2	15.6	12.8	11.9	14.1	15.9	13.3	15.7	14.5
41006	29.3N	077.3W	720	30	1029.5	15 15	1007.3	23 22	1018.3	716	35	23 10	060	13.0	17.5	13.4	9.6	12.6	11.1	8.2	12.9	13.5
42001	25.9N	089.7W	717	30	1027.8	22 15	1009.6	03 22	1019.5	717	30	28 00	350	17.9	14.7	12.4	14.0	10.7	8.4	8.9	17.8	14.3
42002	26.0N	093.5W	717	30	1030.3	22 17	1009.4	04 10	1018.9	713	29	27 18	350	17.2	14.4	10.1	13.8	15.1	10.7	6.1	10.2	14.0
42003	26.0N	085.9W	716	30	1026.5	14 18	1008.9	03 21	1018.3	714	32	19 20	330	19.9	14.8	14.0	15.7	9.2	7.6	7.0	15.6	15.5
42007	30.1N	088.9W	718	30	1032.3	22 16	1010.1	03 21	1020.4	706	29	27 22	320	12.8	13.9	11.0	11.9	9.4	6.8	8.1	12.2	11.9
44004	38.5N	070.7W	126	06	1031.2	01 13	1002.6	06 08	1018.3	127	30	05 12	210	21.6	19.7	13.8	7.8	16.8	19.8	15.3	18.0	17.9
44005	42.7N	068.4W	720	30	1035.9	01 13	998.2	14 09	1016.9	720	27	15 01	330	12.1	11.1	10.5	10.4	12.1	13.3	14.6	16.0	13.3
44007	43.5N	070.1W	400	20	1037.3	01 13	999.2	05 19	1015.6	402	23	17 20	270	11.2	10.5	4.4	5.5	12.1	14.0	14.2	13.1	12.0
44008	40.5N	069.4W	691	30	1034.2	22 15	1002.4	14 04	1017.4	693	16	15 02	330	8.0	7.5	4.5	7.3	6.3	6.7	9.5	10.8	08.1
44009	38.5N	074.6W	646	30	1036.4	22 15	1003.9	29 05	1020.9	662	35	17 05	300	14.0	9.4	10.9	9.6	13.2	14.0	14.0	17.7	14.0
44010	36.9N	075.7W	188	08	1029.5	01 02	1006.3	05 06	1019.4	187	21	02 20	360	15.3	13.8	10.5	7.0	6.0	6.8	9.0	14.3	12.8
44011	41.1N	066.6W	719	30	1033.0	01 15	998.5	14 11	1017.2	714	26	18 00	280	13.8	13.0	6.0	8.9	9.5	9.3	13.0	15.7	12.5
44012	38.8N	074.6W	711	30	1037.0	22 15	1003.8	05 09	1020.8	714	35	14 03	340	17.1	12.4	12.2	9.5	12.9	14.1	8.1	17.7	14.3
44013	42.4N	070.8W	717	30	1035.3	01 13	998.3	05 18	1017.0	717	27	14 23	310	13.5	10.4	8.0	12.0	11.0	13.0	16.0	16.8	13.7
45001	48.0N	087.6W	467	20	1036.9	20 13	995.7	04 12	1016.3	463	25	02 08	200	10.6	9.0	1.5	11.8	10.0	8.1	15.5	12.3	11.7
45002	45.3N	086.3W	707	30	1041.8	21 16	999.8	15 18	1017.7	706	20	15 05	200	16.3	11.0	13.0	14.8	17.0	15.3	16.3	13.1	15.5
45003	45.3N	082.8W	664	28	1041.4	21 16	998.7	15 22	1017.9	661	27	02 11	280	13.0	16.3	9.1	14.3	13.5	11.3	16.0	14.6	13.8
45004	47.2N	086.5W	302	13	1028.2	13 14	997.0	04 12	1015.5	299	30	02 09	280	12.6	12.3	6.7	14.3	13.3	8.9	18.6	13.0	13.7
45005	41.7N	082.5W	718	30	1041.5	21 16	999.9	11 00	1019.8	371	31	16 02	240	11.4	13.8	6.0	10.1	9.8	11.8	15.8	8.6	12.1
45006	47.3N	090.0W	475	20	[illegible]	20 16	995.8	04 10	1017.9	468	25	02 02	290	9.4	9.4	6.5	7.7	8.8	7.9	15.1	9.7	10.4
45007	42.7N	087.1W	477	20	1036.8	20 17	[illegible]	10 04	1018.1	473	27	11 04	010	16.7	12.0	12.3	16.6	18.8	12.4	16.3	13.9	15.1
45008	44.3N	082.4W	667	28	1040.5	21 16	1001.1	04 21	1018.4	666	24	11 11	010	14.3	18.3		15.3	14.3	12.4	14.8	12.2	13.8
46001	56.3N	148.3W	716	30	1016.8	11 19	974.7	22 16	997.7	711	34	01 01	080	9.1	16.4	20.5	14.9	13.2	12.8	11.8	11.3	12.8
46002	42.5N	130.3W	138	17	1019.9	04 10	986.2	02 04	1007.2	138	31	01 13	190	9.4	11.0	14.4	15.9	16.3	13.6	16.8	14.3	14.8
46004	51.0N	136.0W	191	26	1022.8	20 18	974.6	02 12	1001.3	192	33	18 00	310	9.8	10.5	29.4	11.0	13.8	12.3	12.5	14.3	12.7
46005	46.1N	131.0W	716	30	1028.6	21 05	971.2	02 09	1007.2	712	52	26 21	140	20.1	18.8	17.2	21.6	23.1	19.8	21.8	19.8	20.4
46006	40.7N	137.7W	716	30	1036.2	20 20	988.1	02 00	1012.8	715	42	17 14	280	14.3	7.2	8.9	17.9	18.5	21.7	21.6	21.4	20.8
46010	46.2N	124.2W	694	30	1028.1	21 18	981.3	02 10	1010.3	691	30	01 21	170	8.9	7.4	12.7	12.9	19.2	16.1	13.2	11.7	14.9
46011	34.9N	120.9W	718	30	1026.7	09 18	1006.5	13 05	1019.2	703	29	28 04	160	10.5	8.0	4.8	10.8	12.2	7.7	6.4	12.3	10.8
46012	37.4N	122.7W	714	30	1027.3	09 17	999.0	13 04	1018.0	715	39	27 19	160	12.4	7.1	5.7	14.2	15.6	9.4	8.2	13.7	12.6
46013	38.2N	123.3W	713	30	1026.5	09 17	997.9	13 06	1017.1	671	20	27 15	160	8.6	3.3	9.2	12.0	13.1	7.5	8.8	12.2	11.0
46014	39.2N	124.0W	716	30	1026.4	29 19	997.3	13 04	1016.4	683	30	27 16	150	12.2	3.5	6.4	10.0	[illegible]	9.1	9.5	12.8	13.3
46016	63.3N	170.3W	237	30	1017.1	11 03	976.7	21 03	997.8	237	37	27 15	080	17.7	18.7	19.5	25.1	5.4	7.5	7.2	12.6	19.1
46017	60.3N	172.3W	239	30	1015.4	10 21	972.5	21 03	992.6	235	41	27 00	110	16.9	20.1	19.3	19.9	12.8	8.5	8.4	15.5	17.0
46018	60.3N	177.0W	209	30	1016.4	10 21	977.1	27 03	997.3	209	47	26 21	090	23.2	24.2	27.0	20.4	18.8	13.4	15.9	20.2	22.1
46022	40.8N	124.5W	714	30	1026.5	19 07	997.0	27 16	1015.5	713	42	27 15	170	13.7	7.1	5.8	10.3	19.3	12.3	11.8	11.1	14.1
46023	34.3N	120.7W	716	30	1026.6	27 18	1009.0	13 04	1018.8	681	33	19 00	320	17.3	9.0	12.5	13.9	10.5	8.9	8.8	17.7	15.8
46024	32.8N	119.5W	714	30	1026.8	27 18	1012.0	12 23	1018.4	702	23	29 02	310	7.1	6.6	4.3	4.0	6.7	7.6	8.6	12.6	10.5
46025	33.6N	119.0W	715	30	1026.6	27 18	1011.3	25 00	1017.4	687	22	25 09	300	5.7	5.7	6.0	5.4	7.4	5.8	7.9	8.4	07.3
46026	37.8N	122.7W	697	30	1028.3	09 19	999.6	13 06	1018.7	676	33	27 17	150	5.6	7.5	8.6	14.3	13.0	9.3	8.8	11.4	10.9
46028	35.8N	121.7W	716	30	1027.7	09 18	1004.6	13 04	1019.7	708	20	13 04	170	5.5	3.6	5.3	11.3	8.3	6.9	7.0	12.1	10.3
46029	46.2N	124.2W	713	30	1027.8	21 18	982.2	02 10	1010.2	699	40	01 21	180	10.2	8.6	13.0	14.0	19.9	15.4	13.4	12.0	15.3
46030	40.4N	124.5W	713	30	1025.9	19 07	997.2	13 04	1015.5	714	45	27 16	130	13.8	7.7	5.0	19.2	12.9	10.3	9.0	11.2	15.2
46031	55.5N	161.7W	240	30	1020.2	11 04	969.4	21 06	993.3	240	41	27 06	180	12.1	8.9	6.6	14.4	18.9	13.8	11.5	11.0	13.2
46032	54.2N	165.8W	209	30	1016.6	10 21	970.7	21 03	993.3	209	41	12 03	150	17.8	13.8	15.0	21.1	13.2	14.4	14.8	18.4	16.5
46033	55.8N	159.8W	107	14	1014.6	12 09	987.6	01 00	1002.5	235	30	01 03	090	9.2	8.7	18.7	15.8	10.3	15.5	11.3	11.0	12.3
46034	55.1N	163.1W	238	30	1020.7	11 04	970.8	21 07	994.8	238	37	12 01	140	13.1	15.0	19.6	22.9	17.9	13.1	19.0	16.9	18.0
51001	23.4N	162.3W	695	30	1022.1	10 20	1014.4	13 01	1018.6	710	26	27 14	060	13.4	16.3	13.2	11.2	6.6	5.3	2.0	10.8	13.0
51002	17.2N	157.8W	714	30	1018.3	09 20	1010.2	13 02	1015.1	715	27	19 04	090		16.1	17.9	9.9					17.4
51003	19.2N	160.8W	715	30	1018.6	09 20	1010.6	13 02	1015.5	714	20	24 08	100	9.0	12.6	12.6	12.4	10.9	4.0	5.0	1.0	12.5
51004	17.5N	152.5W	536	23	1018.7	23 20	1010.6	13 01	1015.1	536	26	08 16	090	15.0	17.9	17.7	14.8					17.6
ALSN6	40.5N	073.8W	073	04	1027.1	27 23	1000.5	29 11	1013.5	072	45	29 09	230	21.8			30.0	21.6	18.4	26.1	23.0	22.4
BURL1	28.9N	089.4W	715	30	1032.2	22 15	1011.0	03 21	1021.0	715	35	27 20	300	14.0	9.1	12.9	14.4	14.3	7.5	13.2	14.9	13.7
CARO3	43.1N	124.4W	712	30	1028.5	21 17	989.0	02 09	1013.4	713	46	02 09	190	7.1	4.7	4.4	7.2	16.2	10.6	13.7	8.4	12.0
CHLV2	36.9N	075.7W								702	37	14 06	350	19.0	15.8	11.1	8.8	16.4	14.3	12.1	14.5	15.3
CLKN7	34.6N	079.8W	545	24	1033.4	21 15	1006.7	11 22	1021.3	545	27	28 22	170	12.6	10.3	5.6	10.3	13.2	14.0	13.3	14.2	12.8
CSBF1	29.7N	085.4W	688	30	1030.0	14 15	1008.6	03 20	1020.8	689	23	28 04	290	5.0	4.6	5.4	3.5	9.2	8.6	6.8	4.9	05.2
DBLN6	42.6N	079.5W	691	30	1040.8	21 16	1001.1	11 11	1019.4	693	47	16 05	240	11.1	8.9	5.8	11.0	7.9	15.5	21.2	14.1	13.1
DESW1	47.7N	124.5W	691	30	1028.0	21 17	977.3	02 11	1008.8	689	47	03 01	230	4.5	6.6	7.9	20.8	20.7	20.8	15.0	15.4	16.4
DISW3	47.1N	090.7W	713	30	1038.6	20 17	995.0	04 08	1015.4	712	43	02 00	260	13.5	12.1	6.4	6.3	7.7	17.3	19.2	10.6	12.8
DSLN7	35.2N	075.3W	361	16	1032.5	21 15	1008.2	19 20	1021.8	359	41	28 23	170	10.5	17.1	8.3	14.2	24.2	23.3	16.5	9.2	18.1
FBIS1	32.7N	079.9W	708	30	1031.9	21 15	1008.3	05 20	1020.6	711	27	03 11	050	8.6	12.2	5.9	6.0	6.8	9.6	5.4	4.0	08.8
FFIA2	57.3N	133.6W	673	29	1017.6	14 19	965.5	22 17	1002.6	673	47	22 17	180	15.6	4.3	3.6	16.7	18.9	3.9	4.2	11.4	12.5
FPSN7	33.5N	077.6W	679	29	1031.7	21 16	1006.5	11 21	1019.8	679	37	22 20	020	18.6	17.0	11.9	17.9	19.8	23.1	16.3	13.0	17.6
GLLN6	43.5N	076.3W	713	30	1038.3	22 14	1002.3	11 18	1018.1	714	37	01 22	170	10.1	6.3	5.3	17.3	10.7	14.0	19.4	14.2	16.0
IOSN3	42.9N	070.6W	718	30	1035.9	01 13	997.8	05 18	1016.4	718	33	17 14	200	11.9	12.8	8.3	12.5	17.8	15.2	16.9	16.8	15.2
LKWF1	26.7N	080.0W	718	30	1027.5	15 15	1003.4	23 19	1017.2	719	38	23 05	010	14.6	13.4	12.8	11.5	10.7	4.1	3.5	8.8	11.8
MDRM1	44.0N	068.1W	717	30	1036.4	01 12	998.1	30 06	1015.9	718	35	14 16	350	18.3	11.9	12.5	14.8	16.3	16.5	15.5	21.1	17.2
MISM1	43.8N	068.9W	719	30	1035.8	01 14	997.6	05 21	1015.8	696	39	14 21	330	13.2	12.9	14.6	16.6	17.9	16.6	20.3	20.3	18.2
NWPO3	44.6N	124.1W	671	30	1028.3	21 16	988.0	02 10	1011.8	618	44	02 00	190	4.6	3.5	7.5	6.3	14.6	19.2	13.8	12.8	11.8
PILM4	48.2N	088.4W	716	30	1038.6	21 02	994.0	28 06	1014.7	716	43	02 02	270	8.7	6.7	15.7	16.2	13.0	16.6	22.3	12.8	15.1
PTAC1	38.9N	123.7W	714	30	1026.5	29 19	997.8	13 05	1017.2	714	36	27 17	160	11.1	5.0	3.3	11.3	17.1	7.6	9.4	8.7	11.1
PTAT2	27.8N	097.1W	714	30	1035.9	22 16	1007.8	26 21	1019.6	714	30	07 10	360	13.9	11.4	10.2	14.4	12.0	4.5	7.0	12.5	13.1
PTGC1	34.6N	120.7W	649	28	1025.4	27 18	1006.7	13 03	1018.6	650	35	19 02	330	12.4	7.0	3.0	11.1	8.4	4.3	3.0	16.8	11.6
ROAM4	47.9N	089.3W	716	30	1039.2	20 16	994.8	28 05	1015.4	715	40	28 13	230	15.2	14.4	7.7	14.4	18.5	18.0	20.4	17.0	16.3
SBIO1	41.7N	082.8W	712	30	1041.5	21 16	1000.0	11 09	1019.8	715	34	02 01	310	9.6	4.8	8.8	12.3	12.7	11.8	15.5	16.3	13.2
SGNW3	43.8N	087.7W	717	30	1041.2	21 15	1000.3	04 11	1017.4	717	36	10 19	010	16.6	13.3	7.7	13.7	13.6	9.5	13.5	10.2	12.9
STSW1	48.3N	122.9W	702	30	1028.7	14 18	980.2	02 12	1010.1	704	42	19 19	150	4.9	4.5	9.1	10.2	14.5	6.2	11.3	5.3	12.9
SJLF1	30.4N	081.4W	720	30	1030.6	14 15	1010.2	04 19	1020.2	720	31	22 18	020	12.1	12.9	8.7	7.0	8.4	8.6	6.8	7.7	10.1
SRST2	29.7N	094.1W	713	30	1035.9	22 15	1008.9	10 19	1020.8	713	24	08 03	170	9.6	7.9	10.8	11.0	12.5	10.8	5.9	7.9	10.2
STDM4	47.2N	087.2W								718	44	03 16	190	15.9	18.2		19.5	20.9	14.5	20.5	22.5	19.3
TTIW1	48.3N	124.7W	714	30	1027.3	21 15	975.7	02 11	1008.1	714	53	02 21	190	4.7	8.9	19.5	12.8	19.2	21.6	17.8	10.6	18.1
WPOW1	47.7N	122.4W	715	30	1029.3	14 18	983.2	02 13	1011.1	715	33	03 02	190	7.6	3.7	3.0	7.2	15.1	9.5	1.8	3.4	10.6

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BUOY	LAT	LONG	WAVE HEIGHTS (METERS) OBS	MAX	DY	HR	MEAN	FREQUENCY OF WAVE HEIGHTS (%) <1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	711	5.0	14	15	2.2	0.1	25.4	48.1	20.8	5.4			
41006	29.3N	077.3W	720	4.5	23	09	2.2		25.8	59.3	8.0	5.9	0.8		
42001	25.9N	089.7W	717	3.5	22	19	1.3	13.1	44.1	18.2	4.4				
42002	26.0N	093.5W	715	4.0	27	23	1.4	6.7	66.0	25.5	1.1	0.5			
42003	26.0N	085.9W	716	3.5	23	02	1.3	15.5	61.3	21.0	2.0				
42007	30.1N	088.9W	712	2.0	27	11	0.6	59.6	40.1	0.1					
44005	42.7N	068.4W	717	5.0	15	04	1.9	5.8	34.4	42.6	10.5	4.4			
44007	43.5N	070.1W	329	2.5	10	16	1.1	26.1	59.8	13.9					
44008	40.5N	069.4W	694	4.0	15	06	1.6	14.4	46.6	27.9	10.5	0.9			
44010	36.9N	075.7W	183	2.5	03	10	1.3		82.5	17.4					
44011	41.1N	066.6W	718	6.0	15	05	2.3	4.1	18.8	48.8	19.0	8.6	0.6		
45001	48.0N	087.6W	463	4.5	02	00	1.7	14.0	42.3	26.9	12.9	3.6			
45002	45.3N	086.3W	704	4.5	22	17	1.6	12.2	49.7	35.6	5.8	1.5			
45003	45.3N	082.8W	660	4.0	02	10	1.5	20.1	44.0	25.6	9.2	0.9			
45004	47.2N	086.5W	297	5.5	02	03	1.7	19.1	41.4	27.6	4.0	7.7			
45005	41.7N	082.5W	675	2.0	11	16	0.7	53.1	46.0	0.7					
45006	47.3N	090.0W	471	3.5	02	00	1.1	34.1	45.0	15.9	4.8				
45007	42.7N	087.1W	477	4.5	11	05	1.6	10.9	49.4	29.7	6.0	3.7			
45008	44.3N	082.4W	666	4.5	11	15	1.6	10.9	52.5	29.4	5.8	1.2			
46011	56.3N	148.3W	712	10.5	01	13	3.3		11.5	31.7	19.5	32.5	1.9	2.1	0.5
46051	46.1N	131.0W	712	10.5	02	17	4.1		1.9	12.9	31.0	40.1	10.1	3.5	0.2
46066	40.7N	137.7W	715	10.0	02	16	4.3			11.4	33.1	38.8	9.9	6.2	0.2
46108	46.2N	124.2W	458	8.5	03	03	3.2		12.0	27.8	31.1	22.3	6.2	0.4	
46111	34.9N	120.9W	718	5.5	04	03	2.6	0.5	13.3	48.1	20.0	17.8			
46121	37.4N	122.7W	699	6.0	18	20	2.8	0.5	10.3	43.9	27.3	17.4	0.4		
46131	38.2N	123.3W	680	7.0	04	04	3.1	0.5	8.2	36.0	37.5	20.4	3.2		
46141	39.2N	124.0W	691	7.0	03	15	3.0		8.6	34.7	34.5	20.2	1.7		
46231	34.3N	120.7W	705	7.5	04	06	2.9		14.6	40.9	22.2	19.1	2.9		
46241	32.8N	119.5W	712	5.5	04	07	2.4		22.6	47.7	19.9	9.4			
46251	33.6N	119.0W	715	5.5	04	06	1.5	2.9	67.4	29.6					
46261	37.8N	122.7W	664	5.0	04	02	2.4	1.5	16.8	58.6	19.4	11.7			
46281	35.8N	121.7W	715	6.0	03	23	2.7	0.4	9.5	49.5	23.2	17.0	0.2		
46291	46.2N	124.2W	701	9.0	03	02	3.3		12.2	26.6	29.9	22.8	8.1	0.1	
51001	23.4N	162.3W	384	5.5	24	23	1.2			28.8	51.9	19.2			
51002	17.2N	157.8W	710	4.5	28	13	2.7			60.9	29.2	9.7			
51003	19.2N	160.8W	712	4.5	27	11	2.5		2.9	45.4	27.6	3.9			
51004	17.5N	152.5W	297	5.0	20	11	2.9			54.5	29.9	15.4			
CAR03	43.1N	124.4W	123	0.0	00	00	0.0								30.0
CHLV2	36.9N	075.7W	692	2.5	03	13	0.9	32.2	64.0	3.7					

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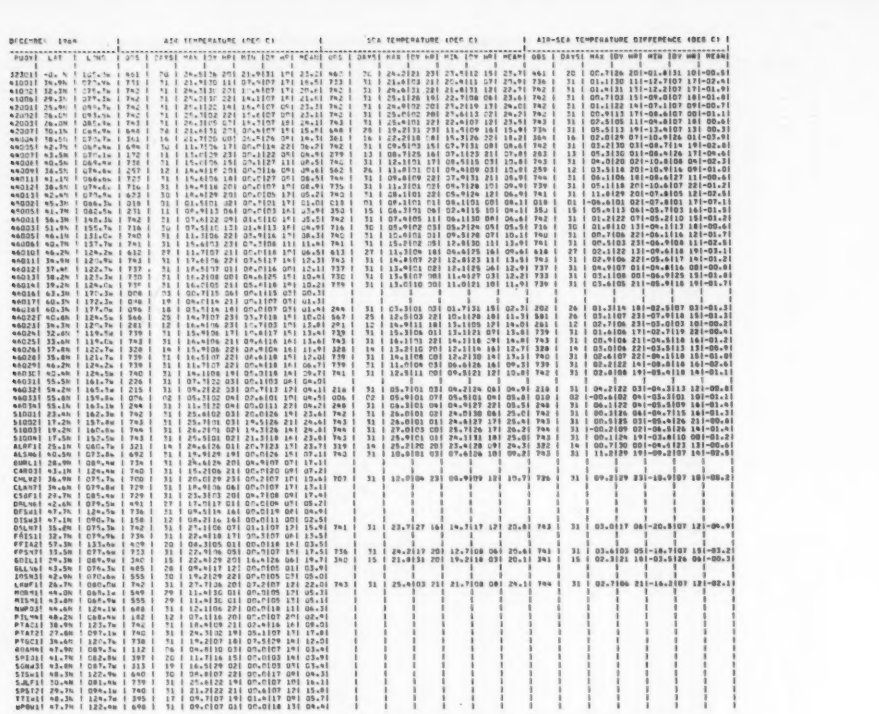
BUOY	LAT	LONG	TOTAL FREQUENCY OF WIND SPEEDS (%) CALM	<1KT	1-10KT	11-21KT	22-33KT	34-47KT	>47KT	TOTAL FREQUENCY OF WIND DIRECTIONS (%) N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		1.0	15.1	54.2	29.1	0.4		15.1	18.3	13.5	4.9	13.6	10.3	6.7	17.4
41002	32.3N	075.3W		2.7	19.8	66.2	11.3			12.4	22.4	17.4	7.7	10.4	10.2	5.5	13.9
41006	29.3N	077.3W		3.5	28.6	56.7	10.9	0.3		13.9	24.9	25.5	8.2	5.9	6.8	4.9	9.9
42001	25.9N	089.7W		3.9	17.0	67.9	11.2			24.1	22.5	20.0	21.1	8.0	2.4	1.2	0.7
42002	26.0N	093.5W		2.0	26.6	64.8	6.6			12.9	22.4	12.3	31.2	17.2	2.4	1.1	0.9
42003	26.0N	085.9W		3.9	18.1	69.5	18.5			25.1	24.2	24.7	19.0	4.3	2.9	1.6	2.3
42007	30.1N	088.9W		3.6	31.9	62.3	2.0			17.5	27.3	12.9	16.7	10.6	6.2	3.6	6.9
44004	38.5N	070.7W			12.6	55.1	32.3			7.7	42.1	14.2	3.0	11.2	12.2	6.7	3.0
44005	42.7N	068.4W		1.9	27.5	68.6	2.0			11.4	9.0	4.6	7.1	14.2	20.0	14.0	23.8
44007	43.5N	070.1W		4.5	30.8	64.2	0.5			15.4	7.3	3.0	4.2	27.4	10.4	10.6	15.4
44008	40.5N	069.4W	1.2	8.2	70.9	21.4				15.0	11.8	4.0	6.8	8.7	14.8	17.3	19.6
44009	38.5N	074.6W	4.5	8.0	23.6	56.6	11.6	0.2		22.5	11.3	6.0	5.7	11.5	9.7	8.1	25.3
44010	36.9N	075.7W		2.7	20.9	76.5				30.3	24.6	10.8	3.1	4.4	8.2	6.8	13.8
44011	41.1N	066.6W		4.1	32.1	59.1	4.8			15.9	15.7	3.8	4.6	8.8	9.6	22.9	18.9
44121	38.8N	074.6W	5.7	6.6	23.2	57.7	12.3	0.1		22.3	17.4	9.4	6.7	10.1	10.6	9.1	19.3
44131	42.6N	070.8W	0.7	3.4	31.7	60.0	7.0			6.5	3.5	6.5	13.8	18.0	19.3	17.8	22.6
45001	48.0N	087.6W		2.4	35.4	59.6	2.6			14.5	9.0	0.3	6.5	22.0	5.7	16.3	23.6
45002	45.3N	086.3W		2.4	15.7	66.9	15.0			17.8	0.7	0.1	1.9	20.9	26.8	13.5	18.6
45003	45.3N	082.8W		2.6	25.9	63.2	8.3			15.1	3.2	0.9	7.8	27.1	12.4	13.9	19.7
45004	47.2N	086.5W		4.3	27.1	56.5	12.0			19.5	7.9	0.6	13.6	19.6	3.5	14.5	20.8
45005	41.7N	082.5W		4.3	40.2	47.4	8.1			11.5	2.5	0.3	7.7	12.9	31.7	25.1	8.4
45006	47.3N	090.0W		7.9	49.4	38.7	4.1			12.1	9.5	3.8	10.9	15.7	5.9	26.9	15.2
45007	42.7N	087.1W		2.1	15.9	71.2	10.8			15.2	2.3	0.5	14.0	22.4	7.8	14.1	23.8
45008	44.3N	082.4W		1.6	23.4	71.6	4.4			12.9	0.3		4.5	30.8	16.5	17.1	17.9
46011	56.3N	148.3W		4.9	30.4	58.5	6.3	0.1		3.5	4.7	5.3	8.5	13.2	22.5	29.3	13.0
46002	42.5N	130.3W		4.5	19.6	55.1	18.8			7.2	1.4	11.1	8.7	12.7	21.2	28.3	9.4
46004	51.0N	136.0W		5.7	33.3	52.1	8.9			11.7	2.7	1.4	9.3	23.6	20.4	20.4	11.3
46005	46.1N	131.0W		0.7	7.4	52.5	33.8	5.1	0.4	4.9	4.5	8.6	8.7	19.5	17.6	26.0	17.8
46006	40.7N	137.7W		2.0	10.3	43.9	38.3	5.5		6.3	3.2	2.8	5.3	5.1	18.3	29.5	31.5
46010	46.2N	124.2W		3.3	19.4	59.6	17.6	0.3		1.2	1.3	27.0	9.9	24.1	20.9	11.0	4.5
46011	34.9N	120.9W		9.7	43.4	43.2	3.7			20.7	9.7	3.3	11.3	12.2	5.4	5.4	31.9
46012	37.4N	122.7W		9.1	34.5	44.1	11.2	1.1		14.4	3.4	6.7	19.8	23.8	7.1	7.2	17.7
46013	38.2N	123.3W		10.7	37.9	48.4	3.0			2.8	1.4	12.5	21.2	16.2	8.0	9.1	28.8
46014	39.2N	124.0W		7.5	39.5	32.2	19.9	0.9		10.1	2.4	9.3	38.9	12.0	5.5	6.2	15.6
46016	63.3N	170.3W		2.1	12.7	44.7	37.6	3.0		15.2	21.1	19.2	15.9	1.2	0.2	2.7	4.4
46017	60.3N	172.3W		5.1	17.4	47.7	26.8	3.0		11.1	15.7	16.8	22.1	12.0	4.9	5.3	12.0
46018	60.3N	177.7W			6.7	42.1	41.3	10.0		14.7	24.3	15.2	17.2	6.4	5.7	4.8	6.2
46022	40.8N	124.5W		4.9	31.1	46.0	16.0	2.0		14.2	2.1	2.2	25.6	35.6	7.5	5.7	7.2
46023	34.3N	120.7W		4.7	21.3	52.1	21.9			15.2	1.1	3.8	10.4	6.8	3.5	6.6	52.6
46024	32.8N	119.5W		8.1	40.6	40.7	0.6			9.7	1.7	2.4	3.7	6.6	6.3	14.0	60.8
46025	33.6N	119.0W		19.4	61.4	19.1	0.1			4.7	0.7	1.6	4.7	7.5	3.2	40.7	21.9
46026	37.8N	122.7W		11.5	38.6	44.8	5.0			1.7	0.7	14.6	13.4	21.6	9.3	9.0	23.7
46028	35.8N	121.7W		10.6	44.9	41.7	2.8			2.4	0.7	1.6	24.0	7.7	6.7	14.8	42.0
46029	46.2N	124.2W		3.3	21.2	46.1	18.5	1.0		1.1	1.7	27.3	8.9	26.1	20.9	10.5	3.5
46030	40.4N	124.5W	3.2	4.9	29.8	41.9	19.7	3.6		10.3	4.0	2.5	11.1	18.0	22.6	11.7	19.3
46031	55.5N	161.7W		11.7	32.1	38.3	16.3	1.7		10.8	4.8	2.5	14.1	8.7	15.4	25.8	26.0
46032	54.2N	165.8W			25.8	48.8	23.0	2.4		4.2	3.2	2.5	14.1	8.7	15.4	25.8	26.0
46033	55.8N	159.8W			55.7	33.6	10.6			16.1	24.5	9.3	17.8	5.1	6.5	7.8	13.3
46034	55.1N	163.1W			14.7	56.3	26.5	2.5		9.3	5.1	2.9	16.7	16.0	7.4	28.3	14.3
51001	23.4N	162.3W	2.5		20.2	73.1	4.1			2.4	9.0	72.1	15.6	1.1	0.6	0.1	<.05
51002	17.2N	157.8W	0.4		5.2	79.7	14.7				4.1	89.9	6.0				
51003	19.2N	160.8W	1.1		21.1	77.7				0.3	14.3	66.0	16.0	2.7	0.3	0.2	0.1
51004	17.5N	152.5W			0.9	84.7	14.4			0.1	26.7	67.0	6.2				
ALSN6	40.5N	073.8W		2.8	6.9	76.1	47.2	6.9		5.2			6.9	27.8	23.6	6.3	30.2
BURL1	28.9N	089.4W	1.8	8.7	24.9	59.2	10.1	0.1		37.0	6.9	13.4	15.0	5.0	1.2	2.4	19.2
CAR03	43.1N	124.4W	2.9	10.4	44.5	30.2	13.5	1.5		2.7	5.3	8.0	27.0	33.7	13.5	6.7	3.0
CHLV2	36.9N	075.7W	0.9	5.8	24.4	48.7	20.2	0.9		25.2	27.5	9.4	5.0	7.0	10.4	7.2	8.3
CLKN7	34.6N	077.0W	1.8	5.7	32.3	57.4	4.4			21.2	12.8	2.2	3.6	8.7	12.4	4.3	10.6
CSBF1	29.7N	087.4W	4.2	29.7	70.3	0.0	0.1			22.1	24.4	15.7	11.0	5.4	3.0	3.3	13.1
DBLN6	42.6N	079.5W	0.7	6.5	39.2	41.6	11.3	1.4		6.0	1.7	1.9	13.2	26.1	17.0	16.4	17.7
DESW1	47.7N	124.5W	1.5	7.4	25.5	38.8	21.6	4.7		4.1	11.8	10.5	41.1	8.2	11.6	6.4	6.2
DISW3	47.1N	090.7W	1.5	8.7	40.4	35.3	14.5	1.1		9.8	5.4	6.4	14.1	16.4	19.4	18.3	10.1
DSLN7	35.2N	075.3W	1.1	3.3	18.7	57.9	37.3	2.8		40.2	7.9	0.4	7.7	8.2	11.1	11.2	7.1
FPSN7	33.5N	077.6W	1.9	5.0	17.5	61.4	34.8	1.3		19.8	35.5	6.4	2.6	4.3	10.1	8.2	13.0
FRYL1	32.7N	079.9W	0.1	15.6	49.1	73.1	1.3			27.5	19.9	7.1	33.7	12.6	0.7	0.4	2.0
FPIA2	57.3N	133.6W	4.6	15.6	32.4	34.8	15.2	2.1		39.7	13.9	2.8	5.4	4.6	9.2	8.9	17.5
FPSN7	33.5N	077.6W	1.9	5.0	17.5	61.4	34.8	1.3		10.3	2.2	3.2	10.5	25.1	9.2	25.1	14.6
GLLN6	43.5N	076.3W	0.8	3.8	23.8	46.5	24.4	1.5		4.7	4.4	5.7	11.2	14.3	16.0	22.7	21.0
IOSW1	42.9N	070.2W	0.4	4.0	28.2	58.5	17.0			11.0	18.4	27.1	7.2	6.4	3.8	6.0	20.2
LKWF1	26.7N	080.0W	1.1	11.0	34.8	49.4	4.5	0.4		13.1	3.9	3.9	8.0	16.6	16.4	13.0	25.1
MDRM1	44.0N	068.1W	1.5	4.3	17.3	45.7	31.5	1.3		1.3	4.3	4.1	9.5	17.8	19.7	16.7	26.7
MISM1	43.8N	068.9W		4.0	16.6	40.4	37.8	1.2		5.4	7.2	4.4	8.5	15.1	9.4	8.0	5.0
NWPO3	48.6N	124.9W	2.4	10.9	42.6	33.5	12.8	1.1		12.7	2.5	3.7	18.5	13.3	13.3	19.3	16.8
PTLW1	48.2N	088.4W	2.2	5.9	25.1	49.6	16.6	2.8		16.7	6.9	9.3	30.3	23.2	3.7	3.8	6.1
PTAC1	38.9N	123.7W	6.2	13.0	43.7	31.7	11.1	0.6		29.4	6.4	10.5	36.3	5.6	1.6	2.0	8.2
PTAT2	27.8N	097.1W	0.8	3.2	25.8	68.2	2.8			49.6	2.7	1.5	9.6	18.8	2.1	1.4	14.0
PTGC1	34.6N	120.7W	3.8	14.6	37.2	35.5	12.3	0.3		16.0	7.3	3.4	10.6	14.8	19.7	12.9	15.4
SDAM4	32.5N	079.3W	2.8	7.4	19.9	51.3	24.1	1.4		9.7	2.3	0.4	9.3	26.2	19.7	15.8	16.6
SRID1	41.7N	082.8W	1.5	6.2	32.6	51.2	11.7	0.3		14.7	1.3	1.0	6.0	32.4	12.9	15.3	16.5
SGNW3	43.8N	087.7W	1.3	5.7	33.3	48.0	12.1	0.8		5.4	7.2	14.9	40.5	15.1	4.4	8.0	5.0
SISW1	48.3N	122.9W	3.4	11.1	38.2	33.8	13.0	1.8		27.2	20.3	9.4	4.9	4.6	8.8	4.6	20.0
SJLF1	30.4N	081.4W	2.8	9.4	51.8	31.3	7.5			24.3	15.1	8.7	17.0	23.1	2.3	1.8	7.7
SRST2	29.7N	094.1W	1.4	6.6	46.1	46.8	0.4			14.2	11.5		3.7	27.3	11.2	13.9	18.2
STDM4	47.2N	087.2W	0.1	2.9	10.6	51.1	27.4	7.9		49.6	2.7	1.5	9.6	18.8	2.1	1.4	14.0
TIW1	48.3N	124.7W	2.9	5.9	16.5	44.3	29.2	8.8	0.3	16.0	7.3	3.4	10.6	14.8	19.7	12.9	15.4
WPOW1	47.7N	122.4W	7.1	17.8	35.4	36.1	10.8			14.7	7.0	2.8	13.1	47.3	10.3	3.6	1.2

NOVEMBER 1984

BUOY	LAT	LONG	% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
			N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		0.3		0.1			0.3	0.2	0.9	2.4	4.2	1.9	1.3	1.5	0.8	2.2	10.9	10.1	0.9	2.3	0.2	3.5	3.9	6.7
41002	32.3N	075.3W	0.2	0.2	0.5	0.5	0.4	0.3	0.4	0.2	2.2	3.9	3.7	3.0	2.6	1.5	1.1	1.8	8.7	14.3	12.6	4.2	5.9	6.9	3.7	9.9
41006	29.3N	077.3W	0.6	0.4	0.8	0.4	0.1		0.3	0.9	2.6	4.0	7.2	4.5	1.1	3.6	3.3	2.4	10.7	12.2	14.7	3.3	4.7	3.2	1.3	6.6
42001	25.9N	089.7W	0.7	0.4	0.6	0.3	0.7	0.7	0.5	<.05	1.4	5.1	3.8	3.3	2.6	0.7	0.1	<.05	15.3	13.5	15.5	16.7	4.7	1.0	0.7	0.5
42002	26.0N	093.5W		0.2	0.4	0.5	0.2	0.3	0.4	<.05	1.8	7.9	6.5	7.3	1.6	0.7	0.6	0.7	8.8	12.7	5.4	21.4	14.8	1.4	0.1	0.2
42003	26.0N	085.9W	0.1	0.9	0.7	0.2	1.0	0.6	0.4	<.05	1.0	5.4	4.3	2.6	1.8	1.4	0.9	0.7	13.6	13.6	18.7	9.4	1.5	0.9	0.2	1.4
42007	30.1N	088.9W	0.7	0.1		<.05	0.5	1.1	0.4	1.0	4.3	4.9	5.2	4.6	6.6	1.9	2.2	2.3	11.6	22.8	7.7	12.1	3.8	1.1	1.0	3.0
44004	38.5N	070.7W									1.4	2.2	4.1	2.6	1.2	0.7	0.8	0.2	1.2	21.5	10.0	0.4	7.1	7.1	5.9	2.0
44005	42.7N	068.4W	0.1				0.6	0.6	0.4	0.2	3.3	2.8	1.8	3.5	3.6	5.8	3.5	3.0	7.9	2.1	2.8	3.6	10.0	13.0	8.9	17.3
44007	43.5N	070.1W	0.2	0.1	0.9	0.6	1.2	0.3	1.0	0.2	5.8	3.2	2.2	3.4	7.9	3.5	1.4	3.4	9.3	4.8		0.2	18.5	12.6	7.8	11.0
44008	40.5N	069.4W	1.0	1.1	1.4	0.4	1.4	2.0	0.7	0.2	12.2	4.9	2.6	7.5	7.2	11.0	9.1	11.0	1.8	0.8		0.9	0.1	1.8	7.6	8.4
44009	38.5N	074.6W	0.6	2.4	0.5	1.3	0.7	0.6	0.4	1.5	5.3	4.3	1.6	1.9	3.6	2.8	1.4	2.8	15.7	4.6	3.9	2.6	6.3	4.6	6.0	12.9
44010	36.9N	075.7W				0.1	1.7	0.8			0.9	2.8	3.5	2.0	1.7	4.0	3.7	2.1	29.4	21.8	7.4	0.9	0.9	3.3	1.1	11.6
44011	41.1N	066.6W	0.4	0.8	0.6	0.6	0.1	0.3	0.6	0.8	3.1	3.4	3.2	2.2	6.2	5.0	7.7	1.3	12.3	11.5		1.8	2.5	4.2	12.9	13.9
44012	38.8N	074.6W	1.2	2.0	0.2	0.3	0.2	0.5	1.5	[illegible]	1.9	4.5	3.1	3.0	3.6	2.7	1.2	3.3	14.8	10.5	6.1	3.1	5.7	6.1	1.1	10.2
44013	42.4N	070.8W				0.3	0.7	0.2	0.2		1.4	2.3	5.5	5.5	4.2	7.0	2.9	2.8	5.1	1.3	0.9	7.7	5.2	11.5	12.6	15.7
45001	48.0N	087.6W		0.3	0.3	0.1	1.2	0.1	0.4		6.4	3.8		1.9	7.7	4.9	3.2	7.6	8.1	5.0		6.5	13.1	0.6	10.0	16.0
45002	45.3N	086.3W	0.4	0.1			0.3	0.5	0.4	0.7	1.5	0.2		0.6	1.6	4.9	3.1	3.9	11.3	0.4	0.1	1.3	15.7	10.4	6.6	13.1
45003	45.3N	082.8W	0.4	0.2	0.1	0.4	0.5	0.4	0.1	0.4	4.5	0.6	0.5	1.3	6.7	5.3	3.6	3.3	0.6	2.2	0.3	5.9	19.4	6.5	6.6	13.7
45004	47.2N	086.5W	1.3	0.4	0.3	0.1	1.3		0.7	0.3	5.4	2.5		1.4	6.9	3.1	2.1	5.7	12.9	4.9	0.3	11.6	7.9	0.4	4.5	14.0
45005	41.7N	082.5W	1.2	0.3				1.1	0.7	0.9	3.0		0.3	3.5	8.7	14.4	5.2	4.6	7.2	2.2		4.2	4.2	13.9	12.9	2.8
45006	47.3N	090.0W	0.7	0.7	1.4	1.2	1.5	0.5	0.9	0.9	6.3	5.1	1.5	8.0	9.7	4.3	6.6	7.9	5.2	3.6	0.9	1.7	4.4	1.1	15.5	6.3
45007	42.7N	087.1W	0.5			0.2	0.4	0.1	0.8	0.2	1.7	0.8	0.2	1.7	2.7	2.1	1.5	5.2	8.2	1.5	0.3	10.6	18.6	5.2	10.3	16.6
45008	44.3N	082.4W							0.5	0.2	3.1			0.4	6.3	5.3	3.2	5.2	8.4	0.3		4.0	23.3	10.7	12.4	12.6
46001	56.3N	148.3W	0.4		0.1	0.3	0.5	1.2	1.6	0.8	1.9	0.5	1.3	2.1	4.0	6.5	9.4	4.6	1.2	3.4	1.0	5.3	7.7	14.6	17.5	7.7
46002	42.5N	130.3W	2.9		2.2			0.7	0.7			0.7	1.4	1.4	3.1	6.9	3.8	2.2	4.3	0.7	4.7	6.3	6.0	11.1	15.9	6.0
46004	51.0N	136.0W	1.0	0.5		0.5	1.0	0.5	1.4	0.7	6.6	1.0		3.6	6.4	6.6	5.3	3.6	3.1	1.2		3.5	13.5	12.2	13.7	4.0
46005	46.1N	131.0W	0.1	0.1	0.1	<.05		0.1	0.1	<.05	0.3	0.9	1.3	1.3	1.2	0.7	0.7	1.1	2.6	2.3	4.2	3.3	2.8	11.9	14.9	10.6
46006	40.7N	137.7W		0.9	0.1	0.1	0.3	<.05	0.2	0.3	1.4	1.3	1.6	1.2	0.4	0.9	1.5	2.1	4.8	1.0	1.0	2.2	1.4	6.6	13.5	13.3
46010	46.2N	124.2W	0.1	0.3	1.0	0.5	0.4	0.2	0.3	0.5	0.5	0.7	4.3	3.3	3.2	3.7	2.7	1.0	0.5	0.3	20.8	5.0	10.3	12.6	7.2	2.9
46011	34.9N	120.9W	1.4	1.1	1.6	0.9	1.5	0.9	1.2	1.1	7.6	5.9	1.4	6.4	4.0	3.3	3.4	11.3	11.7	2.7	0.3	2.4	5.4	1.2	0.8	10.8
46012	37.4N	122.7W	0.3	1.0	1.7	1.6	1.7	1.4	1.0	0.3	3.8	1.4	4.7	6.6	6.1	2.8	3.7	5.5	9.9	1.1	0.3	6.6	10.3	2.6	2.4	10.7
46013	38.2N	123.3W	0.6	0.9	1.4	2.2	1.7	2.3	1.1	0.6	1.1	0.6	6.6	6.2	4.1	3.4	5.7	10.2	1.1		4.6	11.6	9.5	2.3	2.3	17.1
46014	39.2N	124.0W	0.7	1.5	1.9	1.1	0.5	0.2	0.5	0.9	4.4	1.1	6.4	9.2	7.0	3.5	3.4	4.6	3.3		1.0	11.7	3.6	1.8	2.2	6.7
46016	63.3N	170.3W		0.8			0.4		0.4	0.4	1.3	1.3	4.5	1.4	0.7	0.2	1.9	1.4	0.9	11.6	10.5	3.2			0.4	2.2
46017	60.3N	172.3W	0.3	0.1	0.4	1.3	0.3	1.1	0.3	1.7	1.1	1.0	1.6	2.1	4.1	1.9	4.1	1.5	6.8	0.3	0.8	7.9	6.0	1.9	0.9	0.8
46018	60.3N	177.0W									1.0	1.4	0.4	1.7	0.7	0.6	0.5	0.5	7.8	5.5	3.7	0.7	4.2	5.1	4.3	2.8
46022	40.8N	124.5W	0.9	0.4	0.8	1.2	0.9	0.3		0.5	4.8	1.4	1.1	11.9	4.5	2.8	2.3	2.3	4.7	0.4	0.3	11.9	16.8	4.2	3.4	4.4
46023	34.3N	120.7W	0.4	0.1	0.1	0.4	1.2	0.7	0.8	1.0	1.7	0.5	1.5	2.9	2.5	1.5	4.1	6.5	0.7	0.4	1.9	5.8	2.9	1.3	1.7	29.4
46024	32.8N	119.5W	0.7		0.7	2.1	1.4	1.2	0.5	1.5	3.3	1.7	1.6	1.6	3.8	3.4	9.3	15.9	0.6				1.3	1.7	4.2	42.0
46025	33.6N	119.0W	1.9	1.9	1.4	1.9	2.2	2.0	5.3	2.8	5.2	3.2	3.0	2.0	3.0	5.1	26.6	13.3	0.4	0.8	0.3	0.7	2.0	0.5	0.8	5.6
46026	37.8N	122.7W	0.8	1.1	2.3	1.5	2.0	1.7	1.1	1.1	0.7	4.4	6.6	2.3	6.3	3.1	5.0	10.2	0.1	1.2	5.8	0.2	10.7	4.6	2.9	11.2
46028	35.8N	121.7W	0.6	0.4	0.6	1.9	2.2	1.2	1.7	1.9	1.6	0.3	0.9	9.9	3.4	4.4	9.7	14.6	0.2		0.1	10.7	1.6	0.8	3.4	24.0
46029	46.2N	124.2W	0.1	0.5	1.0	0.5	0.3	0.3	0.4	0.2	0.2	0.5	5.7	2.6	3.6	4.6	2.8	1.1	0.7	0.7	19.1	4.0	10.4	12.6	6.6	2.0
46030	40.4N	124.5W	1.3	0.9	0.3	1.0	0.5	0.1	0.8	0.1	4.3	3.6	1.1	9.1	5.4	2.5	2.1	1.9	7.6	1.3	0.1	10.2	7.7	1.7	2.4	2.8
46031	55.5N	161.7W	1.8	0.6	1.1	2.1	0.6	3.1		2.3	3.3	1.7	1.0	1.7	4.2	5.7	5.6	0.9	4.2	1.7		5.2	9.1	11.0	5.2	5.9
46032	54.2N	165.8W									0.8	1.0	1.3	3.1	2.6	5.0	7.5	4.4	1.7	1.7	0.8	4.3	5.7	8.4	14.7	11.5
46033	55.0N	159.8W									13.4	21.7	2.3	3.0	2.0	1.6	4.5	7.2	1.9	2.3	2.8	11.9	2.7	3.6	3.0	5.0
46034	55.1N	163.1W									3.5	1.1	1.1	1.1	2.4	2.5	2.3	0.8	5.3	3.7		7.1	0.9	4.3	16.7	10.3
51001	23.4N	162.3W	0.7	0.2	0.5	0.7	0.1	0.1	0.1		0.5	1.3	12.1	4.9	1.0	0.4		<.05	0.2	4.2	50.7	10.0				
51002	17.2N	157.8W				0.4						0.1	2.4	2.6						3.8	73.0	3.0				
51003	19.2N	160.8W		0.4	0.1		0.1	0.2	0.1	0.1	0.1	2.8	13.9	3.2	0.8	0.1	0.1		0.1	11.1	52.0	12.8	1.7			
51004	17.5N	152.5W										0.2	0.5	0.2					0.1	22.0	55.8	5.9				
ALSN6	40.5N	073.8W					1.4	1.4							2.1	2.1	1.0	1.7	2.1				7.6	16.0		10.4
BURL1	28.9N	089.4W	1.1	0.8		0.5	0.2	0.7	0.5	2.0	10.1	3.2	4.3	2.7	0.9	0.1	0.3	3.2	22.4	2.9	0.2	10.1	3.6	0.4	1.3	10.3
CARO3	43.1N	124.4W	0.3	1.1	2.3	2.6	2.2	0.7	0.2	1.0	2.0	3.9	5.6	20.5	0.2	2.0	1.4	0.6	0.5	0.4	0.1	4.0	13.0	5.7	4.8	1.1
CHLV2	36.9N	075.7W	1.0	0.8	1.9	0.7		0.3	0.6	0.5	4.3	4.5	2.7	2.8	2.0	3.1	2.5	2.5	8.7	17.1	4.7	1.4	3.6	6.8	3.8	3.6
CLAN7	34.6N	079.8W	3.5	0.6	0.7	0.4		0.2	0.2	0.2	10.6	7.4	1.4	1.8	3.3	1.9	1.6	4.4	25.0	4.6	0.1	1.3	4.7	10.6	2.0	9.1
CSBF1	29.7N	085.4W	5.3	7.9	2.2	4.5	0.6	0.4	0.6	4.1	16.9	10.5	12.9	6.4	2.5	1.6	2.5	9.0	0.1		0.3	<.05	2.4	1.0	0.1	
DBLN6	42.6N	079.5W	0.6	0.5	0.3	1.0	2.2	0.5	0.9	0.6	2.1	0.4	1.6	6.1	10.7	6.1	1.2	3.2	3.2	0.8		6.1	5.3	6.7	6.2	13.3
DESW1	47.7N	124.5W	2.0	1.6	1.6	1.1	0.1	0.1	0.3	0.7	1.7	9.3	6.0	3.2	2.1	1.1	1.0	1.2	0.4	1.8	2.0	20.3	2.1	5.6	3.7	2.0
DISW3	47.1N	090.7W	0.4	0.4	0.9	2.7	1.5	1.2	1.3	0.2	2.7	2.0	4.4	9.8	11.5	2.8	2.3	4.8	5.8	2.8	1.1	1.6	3.3	9.0	6.7	5.0
DSLN7	35.2N	075.3W	0.3	0.3		0.3	0.3	0.1	1.0	1.2	6.1	2.2	0.4	2.5	0.9	0.8	2.1	3.6	21.0	2.3	0.2	3.4	1.5	3.4	4.5	1.7
FBIS1	32.7N	079.9W	3.3	1.2	1.1	0.8	0.7	0.6	3.1	5.8	9.5	13.4	5.1	1.5	2.5	5.4	4.4	7.2	7.0	19.7	0.3	0.2	1.1	4.1	0.7	
FFIA2	57.3N	133.6W	1.3	5.9	3.5	1.5	2.1	0.4	0.1	0.6	6.8	9.4	3.5	5.7	8.9	0.3	0.3	0.5	12.2	0.5	0.1	10.1	3.1	<.05		0.6
FPSN7	33.5N	077.6W	0.6	0.5	0.4	0.3			0.1	3.1	6.8	2.2	0.9	0.5	0.7	0.6	2.0	3.8	14.9	5.4	1.3	2.8	1.9	2.8	4.0	0.2
GLLN6	43.5N	076.3W	0.4	0.8	0.7	0.1	0.5	0.6	0.5	0.2	5.6	3.2	2.3	1.7	3.0	1.2	3.1	3.7	4.3	0.6	0.2	6.0	12.4	2.1	12.1	0.7
IOSN3	42.9N	070.6W	0.4	<.05	0.5	0.7	0.5	0.8	0.8	0.3	1.2	1.7	4.2	4.8	1.3	2.7	2.6	2.0	3.1	2.4	0.5	4.9	9.5	10.8	13.2	14.1
LKWF1	26.7N	080.0W	0.5	0.6	0.8	0.3	0.2	1.7	3.6	3.3	3.6	4.3	5.9	2.2	1.8	2.1	2.4	12.6	4.2	12.2	19.7	4.7	4.4			4.2
MDRM1	44.0N	068.1W	0.4	1.2	0.3	0.2	0.4	1.1	0.3	0.4	1.5	0.6	1.5	2.4	2.6	2.9	3.4	2.3	7.7	1.5	1.5	3.6	8.9	6.9	6.5	9.1
MISM1	43.8N	068.9W		0.5	0.1	0.5	0.8	0.8	0.8	0.5	0.4	1.1	1.4	2.2	3.0	4.3	1.5	2.5	0.8	2.7	1.4	4.4	7.3	6.8	5.4	11.5
NWPO3	44.6N	124.1W	0.4	0.2	4.7	2.5	0.9	0.2	0.4	0.4	0.7	0.3	21.6	7.0	7.6	1.8	2.0	1.7	0.1		6.3	2.0	7.5	9.4	5.9	2.3
PILM4	48.2N	088.4W	1.5	0.8	0.2	0.3	0.2	0.3	0.7	1.9	7.1	1.1	0.7	2.3	4.6	3.7	1.6	4.7	4.1	0.6	2.4	13.0	7.0	6.1	7.1	9.4
PTAC1	38.9N	123.7W	0.8	2.5	5.1	2.0	0.6	0.6	0.7	0.7	8.1	3.5	4.2	16.1	5.3	2.1	1.5	3.0	7.0	0.7		8.8	10.2	1.0	1.5	2.4
PTAT2	27.8N	097.1W	0.8	0.3	0.8	0.2	0.1	0.6	0.4	<.05	4.8	2.7	4.6	6.7	2.3	0.9	1.0	2.9	22.2	3.3	5.2	20.7	3.2	0.2	0.6	4.0
PTGC1	34.6N	120.7W	4.1	0.6	1.0	1.7	3.9	1.1	0.9	1.3	17.4	1.2	0.4	3.7	9.9	1.0	0.5	3.1	22.2	0.9	0.2	2.0	4.7	0.2		4.6
ROAM4	47.9N	089.3W	0.3	0.6	1.1	0.8	0.2	0.1	0.1	0.1	2.7	1.9	1.1	1.3	3.7	4.4	2.3	2.5	11.0	2.4	1.2	7.4	7.7	8.8	3.8	9.4
SBIO1	41.7N	082.8W	0.8	1.0			0.4	0.6	1.0	0.5	4.9	1.3	0.2	3.3	7.7	10.3	3.1	1.7	3.9	<.05	0.2	6.0	17.1	7.9	7.7	8.4
SGNW3	43.8N	087.7W	1.0	0.2	0.2	0.9	0.7	1.4	0.8	0.5	3.0		0.5	1.4	9.7	5.6	4.6	0.5	6.3	1.2	0.2	2.1	10.0	5.6	7.6	6.9
SISW1	48.3N	122.9W	2.2	3.2	1.9	0.9	0.4	0.6	0.2	1.6	2.9	3.4	7.0	6.1	5.7	3.4	3.7	3.0	0.2	0.7	4.8	18.1	5.7	0.4	3.5	0.4
SJLF1	30.4N	081.4W	1.8	0.6	1.8	0.7	0.6	0.6	0.7	2.7	12.3	7.5	4.1	3.1	2.6	5.6	3.0	13.7	9.0	0.9	3.8	1.1	1.5	2.6	0.9	3.0
SRST2	29.7N	094.1W	1.6	1.8	0.5	0.8	0.7		0.3	0.8	12.4	9.4	3.5	7.0	6.6	1.3	1.2	4.8	10.3	3.9	4.7	9.2	15.4	1.0	0.2	2.1
STDM4	47.2N	087.2W	0.5	0.9		0.3	0.5	0.4	0.3	0.1	1.8	1.4		0.2	1.1	3.0	1.8	1.3	9.9	4.9		1.7	13.4	5.9	6.3	8.9
TTIW1	48.3N	124.7W	0.3	0.8	2.2	0.9	1.2	0.2	0.1	0.1	0.5	1.4	5.6	3.3	1.2	1.8	1.2	1.5		1.0	18.2	6.5	4.8	6.3	5.4	2.0
WPOW1	47.7N	122.4W	2.8	4.2	1.0	3.5	2.5	0.7	1.8	0.7	7.6	2.2	1.0	5.6	10.8	5.7	2.0	0.5	4.3	0.6		4.0	23.5	3.6		

NOVEMBER 1984

BUOY	LAT	LONG	% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
			N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	3.4	5.6	0.4	0.6	4.4	5.3	1.4	0.2							0.4	0.1								
41002	32.3N	075.3W	1.2	4.0	0.7	0.1	1.6	1.4	0.3	1.9																
41006	29.3N	077.3W		0.1	2.8							0.3														
42001	25.9N	089.7W	6.8	3.5	0.1	0.7				0.1																
42002	26.0N	093.5W	2.3	1.6		2.1	0.5																			
42003	26.0N	085.9W	10.3	4.3	1.0	2.6				0.2																
42007	30.1N	088.9W	0.9	0.4						0.7																
44004	38.5N	070.7W	5.1	18.5			3.0	4.9		0.8																
44005	42.7N	068.4W						0.6	1.1	3.3																
44007	43.5N	070.1W							0.5																	
44008	40.5N	069.4W																								
44009	38.5N	074.6W	0.9				0.9	1.7	0.3	7.9								0.2								
44010	36.9N	075.7W																								
44011	41.1N	066.6W	0.1						1.7	2.9																
44012	38.8N	074.6W	4.2	0.6		0.3	0.5	1.3	0.2	5.1	0.1							<.05								
44013	42.4N	070.8W				0.3		0.6	2.1	4.1																
45001	48.0N	087.6W							2.6																	
45002	45.3N	086.3W	4.5				3.4	2.8	3.4	1.0																
45003	45.3N	082.8W	1.6	0.3		0.2	0.5	0.1	3.6	2.3																
45004	47.2N	086.5W				0.5	3.5		7.3	0.8																
45005	41.7N	082.5W						1.8	6.3																	
45006	47.3N	090.0W							3.9	0.2																
45007	42.7N	087.1W	4.8			1.4	0.7	0.5	1.5	1.9																
45008	44.3N	082.4W	1.4			<.05	1.2	0.6	1.1																	
46001	56.3N	148.3W		0.8	2.7	0.7	1.0	0.2	0.7				0.1													
46002	42.5N	130.3W			2.7	0.9	3.6	2.5	7.8	1.3																
46004	51.0N	136.0W	0.9		1.4	0.7	2.6	1.0		2.2																
46005	46.1N	131.0W	1.4	3.2	2.9	3.2	5.8	4.2	7.7	5.4				0.7	0.7	0.5	2.5	0.6				0.3			0.1	
46006	40.7N	137.7W	0.1			1.7	0.9	10.2	11.3	14.0				0.1	0.1	0.5	2.9	1.7								
46010	46.2N	124.2W			0.8	1.2	9.9	4.4	0.9	0.1					0.3											
46011	34.9N	120.9W				1.6	1.4	<.05		0.7																
46012	37.4N	122.7W	0.3			4.7	4.7	0.3		1.2				0.2	0.9											
46013	38.2N	123.3W				1.2	0.9			0.9																
46014	39.2N	124.0W	1.8			16.0	0.8			1.3				0.9												
46016	63.3N	170.3W	8.1	7.4	15.0	9.7				0.4			1.3	1.7												
46017	60.3N	172.3W	2.9	5.5	6.1	9.5	1.6			1.3		0.9	0.7	1.4												
46018	60.3N	177.0W	9.0	14.0	7.7	5.6	1.9			3.0	2.0	3.3	0.5	1.2												
46022	40.8N	124.5W	3.7			0.6	11.4	0.2		0.1					2.0											
46023	34.3N	120.7W	4.4	<.05	0.2	1.2	0.1			15.9																
46024	32.8N	119.5W								0.6																
46025	33.6N	119.0W								0.1																
46026	37.8N	122.7W				1.4	2.6			1.0																
46028	35.8N	121.7W				1.4	0.5	0.1		0.7																
46029	46.2N	124.2W			1.4	1.8	10.9	3.5	0.7	0.3					1.0											
46030	40.4N	124.5W	3.2	0.2		15.3	1.1							3.6												
46031	55.5N	161.7W	1.6		0.3	2.2	6.9	2.7	0.8	1.0					1.3			0.4								
46032	54.2N	165.8W	1.7	0.6	0.4	4.8	0.4	2.0	3.6	9.6				1.9				0.5								
46033	55.0N	159.8W	0.7	0.4	4.1	2.7	0.4	1.3	0.3	0.6																
46034	55.1N	163.1W	0.6	0.4	1.9	6.8	4.6	0.5	8.4	3.2				1.7			0.8									
51001	23.4N	162.3W	1.3	2.2	0.6																					
51002	17.2N	157.8W		0.2	14.5																					
51003	19.2N	160.8W																								
51004	17.5N	152.5W		3.7	10.6	<.05																				
ALSN6	40.5N	073.8W	3.1			6.9	16.7	1.4	4.2	14.9						2.0	1.0	3.1								
BURL1	28.9N	089.4W	3.4		0.8	1.7	0.2		0.3	3.6								0.1								
CARO3	43.1N	124.4W					0.2	4.7	0.5	<.05					1.2	0.3										
CHLV2	36.9N	075.7W	10.4	5.1	0.2	0.1	1.5	1.0	0.3	1.6	0.8															
CLAN7	34.6N	079.8W	2.0	0.2		0.1	0.6		0.5	1.0																
CSBF1	29.7N	085.4W							0.1	<.05																
DBLN6	42.6N	079.5W				0.1		3.2	7.3	0.6						0.5	0.9									
DESW1	47.7N	124.5W			0.1	12.4	2.5	3.6	1.4	1.5				4.1	1.3	1.2										
DISW3	47.1N	090.7W	0.9	0.2				6.3	7.0	0.1						0.1	1.1									
DSLN7	35.2N	075.3W	18.0	3.1		1.4	3.7	6.0	3.7	0.7				0.1	1.9	0.8										
FBIS1	32.7N	079.9W		1.3																						
FFIA2	57.3N	133.6W	6.8			7.3	0.7			0.3	0.3			1.0	0.7											
FPSN7	33.5N	077.6W	14.7	5.5	0.3	1.7	1.7	5.6	2.8	2.3	0.6	0.3		0.1	0.2	0.1										
GLLN6	43.5N	076.3W	0.1			2.6	9.8	1.3	8.7	1.9				0.1	0.7		0.7									
IOSN3	42.9N	070.6W		0.3	0.5	0.9	3.1	1.7	6.1	4.5																
LKWF1	26.7N	080.0W	2.3	1.3	0.7					0.2	0.4															
MDRM1	44.0N	068.1W	3.1	0.6	0.5	1.9	4.7	5.4	2.8	12.4	0.3							0.9								
MISM1	43.8N	068.9W			1.1	7.2	6.6	7.8	8.8	11.2				0.2			0.2	0.9								
NWPO3	44.6N	124.1W					4.2	7.2	1.1	0.2					0.7	0.4										
PILM4	48.2N	088.4W			0.4	2.8	1.5	3.9	7.2	0.8							2.8									
PTAC1	38.9N	123.7W	0.8	0.2		3.3	6.7		0.1					0.1	0.4											
PTAT2	27.8N	097.1W	1.5	0.1		0.7				0.5																
PTGC1	34.6N	120.7W	5.9			1.4	0.3			4.7								0.3								
ROAM4	47.9N	089.3W	2.0	2.5		1.0	3.1	5.5	6.6	3.3						1.0	0.3	0.1								
SBIO1	41.7N	082.8W	0.1				1.0	0.9	3.8	5.9							0.1	0.1								
SGNW3	43.8N	087.7W	3.5			1.6	4.0	0.3	2.3	0.5	0.8															
SISW1	48.3N	122.9W			0.7	13.9	2.9		0.6					1.4	0.4											
SJLF1	30.4N	081.4W	4.2	3.3																						
SRST2	29.7N	094.1W				<.05	0.4																			
STDM4	47.2N	087.2W	2.1	4.0		1.4	10.9	1.9	2.8	4.4		0.3		0.1	1.3	0.1	2.6	3.6								
TTIW1	48.3N	124.7W		0.1	12.7	1.2	2.5	5.3	2.5	<.05		0.1	4.8	0.1	1.8	1.4	0.2						0.2	<.05		
WPOW1	47.7N	122.4W					10.5	0.3																		



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WAVE HEIGHTS (METERS)

BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN
41001	34.9N	072.9W	725	5.5	07	05	1.7
41006	29.3N	077.3W	738	4.0	07	04	1.5
42001	25.9N	089.7W	739	3.0	06	18	1.2
42002	26.0N	093.5W	740	4.0	13	20	1.3
42003	26.0N	085.9W	742	3.0	07	01	1.3
42007	30.1N	088.9W	637	2.0	05	01	0.5
44004	38.5N	070.7W	328	4.0	25	18	1.7
44005	42.7N	068.4W	736	5.5	07	13	2.1
44007	43.5N	070.1W	256	3.5	22	14	0.9
44008	40.5N	069.4W	739	4.5	07	18	2.1
44011	41.1N	066.6W	733	6.5	07	09	2.3
45002	45.3N	086.3W	018	1.0	01	00	0.9
45005	41.7N	082.5W	336	2.5	14	11	0.7
46001	56.3N	148.1W	740	8.5	09	09	1.7
46003	51.9N	155.7W	713	12.0	11	09	1.8
46005	46.1N	131.0W	736	7.5	13	02	1.4
46006	40.7N	137.7W	739	6.0	17	15	1.1
46010	46.2N	124.2W	591	4.5	13	12	1.6
46011	34.9N	121.9W	743	6.0	13	04	1.1
46012	37.4N	122.7W	737	5.0	12	23	1.1
46013	38.2N	123.3W	737	4.5	12	20	1.3
46014	39.2N	124.0W	732	5.5	13	02	1.4
46022	40.8N	124.5W	339	5.0	18	23	1.2
46023	34.3N	120.7W	213	4.0	06	16	1.2
46024	32.6N	119.5W	732	7.0	13	08	1.8
46025	33.6N	119.0W	743	3.5	13	02	1.2
46026	37.8N	122.7W	307	3.5	12	21	1.0
46028	35.8N	121.7W	729	6.5	13	03	2.5
46029	46.2N	124.2W	736	7.0	13	11	1.6
51001	23.4N	162.3W	741	6.0	09	01	1.9
51002	17.2N	157.8W	746	5.5	10	08	1.8
51003	19.2N	160.8W	744	5.5	09	15	1.7
CHLV2	36.9N	075.7W	707	2.5	06	05	0.8

FREQUENCY OF WAVE HEIGHTS (%)

BUOY	<1M	1-1.5M	2-2.5M	3-3.5M	4-4.5M	5-7.5M	8-9.5M	10.5M
41001	2.0	44.6	25.6	4.8	2.7			
41006	2.3	44.6	30.0	2.7	0.2			
42001	27.4	49.7	21.9	0.8				
42002	51.3	28.5	14.5	4.7	0.4			
42003	29.9	39.2	25.1	0.6				
42007	69.7	29.8	0.4					
44004		54.5	38.7	4.6	0.3			
44005	1.3	37.7	39.8	13.8	7.2			
44007	48.5	51.5	0.9	1.9				
44008	0.6	35.1	42.6	20.5	0.9			
44011		33.7	31.5	24.6	8.2	1.7		
45002		83.3						
45005		54.4	42.5	3.2				
46001			4.3	29.1	29.7	30.8	5.1	2.1
46003			6.7	19.6	26.3	36.0	8.2	1.9
46005			4.3	28.4	37.6	27.5	2.2	
46006			1.6	21.5	31.9	39.4	6.5	
46010			10.4	43.1	27.5	14.3	1.8	
46011			36.2	47.1	10.7	5.2	0.6	
46012			32.4	49.5	13.6	2.9		
46013			22.1	49.3	23.4	4.1		
46014			24.5	42.7	27.7	4.9		
46022			19.7	42.2	12.0	5.8		
46023			16.9	40.0	22.5	0.4		
46024	0.1		41.5	48.9	7.2	2.5	1.6	
46025	19.8		24.4	48.0	7.4			
46026			28.0	49.5	21.2	7.9	1.2	
46028			16.9	45.6	28.0	11.1	1.2	
46029			3.2	44.5	29.3	23.7	0.1	
51001			2.0	52.9	24.9	18.1		
51002			3.4	57.5	26.3	12.6		
51003			2.8	53.7				

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TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT
32301	-0. N	105.0W			34.7	65.3			
41001	34.9N	072.9W		3.6	25.3	58.1	12.3	0.7	
41002	32.3N	075.3W		2.3	47.0	47.4	3.3		
41006	29.3N	077.3W		1.2	49.2	39.7	9.9		
42001	25.9N	089.7W		1.4	30.6	60.9	6.9		
42002	26.0N	093.5W		2.6	27.9	61.0	8.5		
42003	26.0N	085.9W		4.1	21.5	68.3	6.1		
42007	30.1N	088.9W		7.1	52.5	38.5	1.9		
44004	38.5N	070.7W		3.5	21.0	55.0	20.7		
44005	42.7N	068.4W		4.1	26.3	60.9	8.7		
44007	43.5N	070.1W		5.0	30.1	41.6	3.2		
44008	40.5N	069.4W	0.9	13.0	43.4	23.6			
44009	38.5N	074.6W	3.8	9.1	43.7	40.6	6.6		
44011	41.1N	066.6W		4.4	33.2	54.7	7.6		
46021	58.3N	147.7W	5.0	5.7	41.7	45.9	6.7		
46022	40.8N	124.5W	1.6	4.9	32.8	57.9	4.5		
46023	34.3N	120.7W			9.1	74.4			
46025	33.6N	119.0W		4.9	35.2	49.6	10.3		
46026	37.8N	122.7W		1.1	11.3	61.1	26.6		
46027	41.8N	124.4W		0.8	11.3	61.1	26.6		
46028	35.8N	121.7W		3.7	18.9	42.3	33.3	0.8	
46029	46.2N	124.2W		2.1	10.6	58.7	28.1	1.8	
46030	40.4N	124.5W		0.8	11.3	61.1	26.6	0.3	
46035	57.0N	177.7W		0.5	8.6	59.8	32.8		
46036	48.2N	124.2W		6.4	33.1	54.2	6.3		
46041	47.3N	124.7W		8.1	41.3	45.0	5.1	0.4	
46042	36.8N	122.4W		4.9	30.1	53.5	10.7	0.8	
46047	32.4N	119.5W		3.3	41.7	47.2	7.3		
46050	44.7N	124.5W		8.8	41.9	43.5	5.9		
46053	34.2N	119.8W		1.7	24.4	39.2	31.9	2.2	0.4
46054	34.3N	120.5W		1.8	19.2	55.8	23.2		
46059	38.0N	129.9W		4.9	36.8	46.3	11.9		
46060	60.6N	146.8W		1.8	11.3	61.1	26.6		
46061	59.9N	148.0W		1.8	11.3	61.1	26.6		
46066	52.8N	155.0W		4.4	33.6	54.2	7.8		
46070	24.8N	164.2W				83.3	16.7		
46071	51.1N	179.1W			19.0	31.9	43.1	6.0	
46072	34.4N	129.7W				83.3	16.7		
46073	54.2N	164.0W			4.4	39.1	56.5		
46075	53.9N	160.8W			7.4	79.8	12.8		
46076	55.8N	164.1W			12.7	80.6	6.7		
46077	54.2N	165.8W			23.9	48.9	27.2	0.5	
46078	55.8N	159.8W				83.3	16.7		
46080	57.9N	152.5W			7.4	79.8	12.8		
46081	58.5N	152.1W			12.7	80.6	6.7		
46082	55.1N	163.1W			19.0	31.9	43.1	6.0	
51001	23.4N	162.3W		2.6	27.5	63.6	6.4		
51002	17.2N	157.8W			9.6	67.7	22.7		
51003	19.2N	160.8W		7.3	35.4	56.6	0.7		
51004	17.5N	152.5W			7.4	79.8	12.8		
ALRF1	25.1N	080.7W			12.7	80.6	6.7		
ALSN6	40.5N	073.8W	1.9	6.9	22.3	51.6	16.4	0.8	
BURL1	28.9N	097.0W	1.8	8.0	37.9	50.0	4.2		
CAR03	43.1N	124.4W	4.6	18.7	51.6	26.1	3.7		
CHLV2	36.9N	075.7W	1.8	6.6	35.1	46.2	12.0	0.1	
CLKN7	34.6N	077.0W	2.6	10.0	57.1	29.6	0.3		
CSBF1	29.7N	085.4W	2.6	45.3	53.7	0.9			
DPLN6	42.6N	079.5W	2.6	12.0	33.4	28.5	23.0	0.0	
DESW1	47.7N	124.5W	3.1	14.6	45.2	26.0	11.0	0.4	
DISW3	47.1N	090.7W	2.2	5.5	30.1	45.4	16.0	0.9	
DSLN7	35.2N	075.3W	1.5	4.2	31.0	46.8	16.8	1.1	
FBIS1	32.7N	079.9W	5.5	39.1	50.1	10.2	0.5		
FFIA2	57.3N	133.6W	3.1	8.4	25.7	40.3	21.1	4.6	
FPSN7	33.5N	077.6W	4.2	9.5	31.3	48.5	12.4	0.3	
GDIL1	29.3N	089.9W	0.9	10.9	45.3	23.8			
GLLN6	43.5N	077.7W	1.2	3.5	21.5	53.7	18.9	1.3	
IOSN3	42.9N	070.6W	1.1	3.5	22.0	52.7	21.4	0.4	
LKWF1	26.7N	080.0W	0.9	10.8	38.8	40.5			
MDRM1	44.0N	068.1W	1.3	5.6	16.0	46.6	30.3	3.2	0.1
MISM1	45.8N	088.9W		2.3	19.8	49.4	31.2	4.1	0.1
NWPO3	44.6N	124.1W	2.9	14.8	47.1	32.4	3.4	0.3	
PILN6	40.2N	098.4W	0.4	1.9	25.4	45.5	25.7	1.5	
PTAC1	38.9N	123.7W	3.0	16.5	52.8	28.2	2.4		
PTAT2	27.8N	097.1W	1.5	4.6	47.4	43.5	4.0		
PTGC1	34.4N	120.7W	3.7	15.4	46.0	32.4	9.2	2.8	
ROAM4	47.9N	089.3W	0.4	1.4	7.7	57.4	28.5	4.9	
SBIO1	41.7N	082.8W	1.9	6.9	27.6	48.9	14.6		
SSNW3	43.8N	087.7W	2.3	7.7	28.0	52.3	11.9	0.1	
STSU1	48.3N	122.9W	2.3	10.5	49.0	31.1	9.2	0.1	
SJLF1	30.4N	081.4W	5.8	26.2	61.8	12.0			
SRST2	29.7N	094.1W	0.7	5.4	54.0	40.6			
STDM4	47.2N	087.2W	0.4	0.8	11.7	46.1	35.7	5.7	
TTIA1	48.3N	124.7W	1.0	7.6	25.0	35.7	29.3	10.4	
WPOW1	47.7N	122.4W	4.3	23.5	46.5	24.6	0.9		

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	N	NE	E	SE	S	SW	W	NW
32301			45.1	54.9				
41001	15.3	9.7	5.2	4.8	13.5	17.8	18.7	15.0
41002	8.4	11.1	7.6	6.8	14.7	30.9	7.5	14.7
41006	9.8	18.0	18.6	13.6	12.3	11.6	6.6	8.0
42001	3.9	10.6	46.5	24.9	10.3	3.1		1.3
42002	4.1	4.9	13.9	47.1	26.2	2.7	0.2	0.8
42003	4.5	16.2	47.3	12.6	1.1	2.7	3.7	2.9
42007	7.6	10.4	24.6	18.2	14.0	8.8	5.0	3.3
44004	12.7	11.8	9.9	4.8	3.7	14.0	22.0	21.5
44005	9.2	3.2	7.2	9.3	8.1	21.1	26.9	15.4
44007	23.8	3.4	3.0	5.8	4.4	28.2	18.9	12.4
44008	11.7	9.3	7.7	9.6	4.9	19.1	18.4	19.3
44009	12.9	9.6	12.6	4.8	9.1	23.8	10.0	17.0
44011	12.1	9.6	4.4	5.5	9.4	11.1	25.5	22.3
46021	13.3	10.3	14.5	7.6	6.1	24.0	9.7	14.4
46022	12.2	3.3	4.7	5.9	9.9	20.7	27.5	15.8
46023	16.1							81.9
46025	4.4	3.8	3.9	9.2	17.5	22.7	26.2	12.2
46026	1.5	2.6	4.0	12.6	7.7	17.1	32.0	22.4
46027	1.9	1.2	6.8	12.6	20.8	17.9	29.5	9.4
46028	20.4	2.8	3.5	10.6	8.2	9.9	15.9	29.1
46029	23.9	2.1	0.3	12.1	10.5	9.9	12.7	28.4
46030	4.2	6.8	36.4	8.2	12.8	9.6	13.6	8.6
46035	18.3	15.6	5.8	25.3	7.5	1.8	2.9	22.8
46036	23.9	13.9	14.2	17.2	6.7	1.5	1.5	21.0
46041	4.5	5.7	40.8	7.7	1.4	1.1	2.7	36.0
46042	16.2	7.7	19.0	22.7	5.6	1.5	1.6	26.7
46047	10.8	38.9	26.2	6.6	3.2	8.3	4.1	2.7
46050	12.8	10.0	16.7	13.6	12.3	7.9	5.7	12.9
46053	11.1	17.6	18.6	14.3	7.2	9.9	8.1	9.1
46054	33.2	18.1	9.1	23.2	16.3	1.6	1.3	5.2
46059	9.9	3.6	19.7	35.8	3.8	1.2	0.8	29.2
46060	7.4	1.9	8.0	16.1	9.2	7.4	7.8	42.2
46061	7.4	1.9	6.0	16.1	9.2	5.7	13.8	20.5
46066	16.6	8.9	19.0	15.7	9.8	5.7	4.8	29.3
46070	1.6	23.1	35.3	6.3	3.2	1.4	4.8	24.3
46071	4.7	2.0	12.2	24.9	4.5	1.5	4.1	46.1
46072	3.5	10.5	32.4	4.8	13.2	10.9	13.8	10.5
46073	36.8	19.6	4.8	26.0	6.3	0.4	0.8	5.7
46075	5.3	1.8	3.0	13.0	36.3	9.1	12.5	19.1
46076	8.9	1.5	5.5	23.6	18.0	16.7	15.5	10.4
46077				20.8	41.7	37.5		
46078				20.8	41.7	37.5		
46080	6.0	5.6	5.3	28.2	20.8	3.8	11.6	18.4
46081	2.6	11.9	14.9	38.1	11.5	7.4	6.9	3.2
46082	2.6	12.0	51.6	20.3	9.0	2.8	0.8	0.8
51001	0.8	8.3	84.5	6.2				0.1
51002	2.6	12.0	51.6	20.3	9.0	2.8	0.8	0.8
51003	0.5	23.2	74.5	1.9				
51004	2.6	25.5	70.3	1.6				
ALRF1	10.2	9.7	13.8	8.5	2.2	7.7	16.6	31.3
ALSN6	15.4	16.5	29.3	20.5	5.6	4.2	1.6	6.8
BURL1	11.4	13.4	9.9	29.8	22.4	5.6	4.0	3.6
CAR03	14.5	18.9	11.4	3.4	5.7	20.3	16.6	9.1
CHLV2	17.8	17.4	1.0	1.5	4.4	26.7	19.2	11.9
CLKN7	7.8	18.8	38.3	12.0	7.8	5.7	3.4	7.0
CSBF1	1.5	4.9	6.8	8.4	19.5	32.4	23.9	2.6
DPLN6	6.5	19.6	14.1	25.4	10.4	2.4	0.1	12.6
DESW1	5.1	7.9	8.9	6.9	12.0	18.5	29.2	11.5
DISW3	22.8	8.3	2.1	4.0	2.9	16.1	26.4	17.3
DSLN7	13.0	17.1	7.3	1.9	3.3	26.5	21.5	9.3
FBIS1	36.8	8.0	4.0	32.5	15.0	0.5	0.1	3.2
FFIA2	18.2	13.9	1.9	2.7	3.5	22.3	23.8	13.7
FPSN7	15.4	4.2	4.4	4.0	6.0	24.9	25.1	16.2
GDIL1	2.2	13.1	40.2	31.6	6.5	3.0	0.5	0.9
GLLN6	5.2	12.9	5.3	11.9	18.2	9.0	26.8	10.7
IOSN3	6.4	10.6	46.4	8.8	5.0	3.3	3.7	15.8
LKWF1	2.2	6.3	9.6	6.7	8.3	14.9	19.9	26.2
MDRM1	4.5	8.6	7.1	8.9	7.1	18.6	24.8	23.0
MISM1	4.5	7.9	46.5	5.2	5.6	12.6	8.8	9.1
NWPO3	12.3	8.6	4.6	9.4	10.3	11.3	25.4	21.1
PILN6	23.9	11.8	12.1	25.9	11.5	1.4	0.7	3.0
PTAC1	17.9	13.6	19.6	37.0	7.0	0.6	0.4	4.0
PTAT2	40.0	6.0	1.7	20.0	20.0	1.7	0.2	10.4
PTGC1	26.8	6.7	0.3		5.6	23.6	20.7	16.6
ROAM4	4.0	5.0	7.5	10.6	15.5	22.0	26.8	10.6
SBIO1	11.1	9.7	2.5	6.7	10.4	15.1	28.2	13.3
SSNW3	15.3	18.6	14.6	24.1	12.0	2.9	8.2	4.0
STSU1	22.2	19.8	8.0	7.1	7.0	13.0	14.0	8.8
SJLF1	8.2	15.3	18.2	32.3	17.0	5.2	1.2	2.7
SRST2	13.0	3.6	5.3	7.0	18.6	8.5	15.5	30.5
STDM4	0.6	4.1	44.1	10.3	17.2	1.1	14.7	8.0
TTIA1	17.5	15.0	4.3	10.2	30.3	15.1	3.8	1.8
WPOW1								

DECEMBER 1984			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
32301	-0. N	105.0W											20.0	14.8							25.1	40.2				
41001	34.9N	072.9W	0.6	0.5	0.1		0.6	0.1	0.9	0.8	4.8	4.1	3.3	1.7	1.2	0.9	5.4	4.2	9.1	5.1	1.7	2.3	8.8	12.1	11.1	7.9
41002	32.3N	075.3W	0.1				0.2	1.1	0.4	0.4	6.1	6.9	3.3	2.0	3.7	12.7	5.0	7.2	2.1	4.2	4.5	2.8	9.6	16.3	1.2	6.8
41006	29.3N	077.3W	1.3	1.0	1.5	1.6	1.8	4.3	2.7	1.0	5.6	10.3	5.5	9.5	6.5	3.8	5.1	2.7	2.4	6.7	11.7	2.5	4.0	3.3	0.8	3.3
42001	25.9N	089.7W	0.1	0.3	0.4	0.3	0.1	0.1			0.5	3.6	10.4	7.8	6.7	1.8			1.4	5.3	34.2	15.2	3.1	1.1		0.7
42002	26.0N	093.5W		0.1	0.4	1.3	0.7				0.8	1.7	2.6	12.0	6.9	1.8	0.1	<.05	1.5	3.0	10.5	29.4	14.8	0.9	0.1	0.7
42003	26.0N	085.9W	0.6	0.3	0.2		0.1	1.0	0.7	1.0	2.4	4.8	5.4	2.5	0.1	1.4	1.7	1.0	2.3	9.2	45.7	8.9	0.8	0.3	1.2	
42007	30.1N	088.9W	1.6	0.5	0.4	7.2	0.2	0.4	0.4	0.9	2.3	4.2	14.0	11.9	9.0	6.2	4.4	0.4	3.2	12.7	9.9	4.0	4.9	2.0		1.9
44004	38.5N	070.7W	0.6	0.3			0.3	0.3	1.0	0.9	3.5	5.1	3.2	0.3	0.4	1.7	1.8	4.8	7.2	4.9	6.7	3.9	1.7	6.0	13.1	11.5
44005	42.7N	068.4W	0.5	0.2	0.7	0.1	0.9	0.7	0.7	0.2	4.7	1.5	2.8	2.4	2.0	4.4	4.1	4.4	3.8	1.6	3.4	5.8	5.1	15.2	16.6	9.6
44007	43.5N	070.1W	1.5	1.4	0.4			0.7	0.3	0.7	15.6	2.0	1.0	2.9	1.1	2.8	1.9	3.0	6.7		1.7	2.6	3.3	23.2	15.4	0.7
44008	40.5N	069.4W	2.7	2.5	2.4	0.5	0.5	1.7	0.6	2.1	6.5	5.3	4.4	6.9	4.0	11.2	9.8	13.3	0.5	1.5	0.8	2.2	0.5	4.2	8.0	3.9
44009	38.5N	074.6W	2.6	0.3	1.9	0.2	0.5	1.3	1.3	1.1	7.8	5.0	4.2	3.5	5.2	9.9	3.7	4.4	2.6	4.4	5.8	0.9	2.8	11.2	4.3	0.7
44011	41.1N	066.6W	0.5	0.9	0.8	0.3	0.5	0.8	0.2	0.5	6.1	3.2	3.1	2.6	4.5	4.0	3.1	6.5	5.5	5.2	0.4	2.1	3.5	6.0	18.0	13.8
44012	38.8N	074.6W	0.9	0.6	0.4	<.05	0.1	1.3	1.6	0.7	4.5	7.3	5.5	2.7	4.7	8.0	4.5	4.6	6.0	2.4	8.6	4.2	1.3	13.7	3.0	5.9
44013	42.4N	070.8W	0.4	0.3	0.1	0.2	0.6	1.7	0.6	1.5	5.3	1.1	1.8	2.5	6.1	5.7	4.1	6.5	6.3	1.9	2.4	2.9	3.1	13.4	20.4	7.5
45002	45.3N	086.3W									4.2							1.4	13.9							80.6
45005	41.7N	082.5W	0.2	0.6	0.6	0.4	1.1	0.6	0.6	0.9	2.8	0.2	1.1	5.1	9.7	4.0	3.2	7.1	1.4	2.9	2.2	3.7	6.7	13.4	10.6	2.6
46001	56.3N	148.3W		0.1			0.1		0.2	0.3	1.5	0.9	0.9	1.0	1.0	1.4	1.8	2.7		1.5	2.0	7.5	3.6	12.5	19.4	14.5
46003	51.9N	155.7W	0.4	0.4	0.4	0.3	0.4	0.8	0.6	0.5	1.1	0.5	1.7	1.6	3.2	3.7	4.5	2.7	0.4	0.1	2.5	6.2	11.6	7.0	11.8	3.7
46005	46.1N	131.0W	0.1				0.5	<.05		0.1	0.7	0.4	1.4	0.9	1.3	0.5	2.3	3.1	10.3	1.7	1.7	4.3	4.7	6.1	9.2	12.7
46006	40.7N	137.7W	0.1	0.1		0.1				0.1	0.5		0.2	0.3		1.1	2.8	1.6	11.0	0.8	0.1	11.0	7.5	7.8	7.9	13.7
46010	46.2N	124.2W	0.3	0.3	2.4	0.9	0.3	0.7	1.2	0.3	2.2	3.9	10.5	4.7	0.5	2.1	5.1	4.1	1.8	2.6	22.6	2.6	8.3	6.2	6.9	3.3
46011	34.9N	120.9W	1.7	1.9	1.6	0.9	0.6	0.3	0.6	1.0	10.0	11.2	2.9	7.0	1.9	0.9	1.8	5.7	6.2	2.5	1.2	16.9	4.4	0.6	0.5	12.8
46012	37.4N	122.7W	0.5	0.7	1.2	0.7	0.4	0.2	0.2	0.9	6.8	5.5	3.7	4.4	1.9	0.7	0.9	6.2	12.9	7.3	8.1	9.5	3.4	0.6	0.3	11.4
46013	38.2N	123.3W	0.9	1.4	1.7	1.7			1.2	1.4	2.8	3.0	20.7	1.8	1.1	1.0	1.3	9.5	0.7	1.4	18.3	3.0	0.3	0.1	0.2	22.4
46014	39.2N	124.0W	1.1	2.5	1.2	0.9	0.2	0.4	0.8	1.6	6.8	5.0	10.0	6.0	3.2	1.0	0.7	7.5	5.7	0.2	7.1	14.3	2.1	<.05	0.1	14.0
46016	63.3N	170.3W	0.9	0.4					0.4		4.0	6.6	7.1	1.0	0.3	2.7	1.2	1.7	4.5	13.1	10.8	1.5	0.6	3.1	2.0	4.0
46017	60.3N	172.3W				0.4				1.7	2.9	0.9	2.3	3.3	1.9	2.1	1.0	1.5	8.3	4.7	5.5	6.5	4.6	2.8	3.1	7.4
46018	60.3N	177.0W				0.1	0.3				1.9	0.9	1.6	1.7	0.7	0.7	0.6	3.3	7.6	6.7	5.9	8.1	2.6	4.1	2.4	4.5
46022	40.8N	124.5W	2.5	1.0	2.4	4.0	1.3	0.2	0.6	2.1	11.9	7.3	6.1	13.5	6.3	0.9	0.6	2.5	10.8	1.8	0.6	5.3	7.0	0.5		0.6
46023	34.3N	120.7W		0.1	0.3	0.7		0.1	0.3	0.4	1.4	1.9	5.0	4.5	3.3	0.7	0.8	1.9	4.0	1.6	12.8	21.7	0.5	0.4		14.8
46024	32.8N	119.5W	1.0	0.6	0.9	0.6	1.7	1.0	2.4	0.9	3.7	1.3	4.7	9.0	6.2	3.5	4.1	13.7	2.2	<.05	2.3	6.5	1.3	2.1	1.3	23.1
46025	33.6N	119.0W	2.3	2.0	2.3	2.3	1.9	2.4	2.1	2.6	2.7	5.7	12.9	9.4	6.0	2.9	8.6	11.1	1.0	1.2	3.4	4.0	1.8	0.3	2.9	4.0
46026	37.8N	122.7W	0.6	0.6	0.8	0.4	0.8	1.3	1.8	0.7	0.8	13.8	19.4	2.2	1.6	0.1	1.8	2.9	0.2	6.6	15.0	3.7	1.0		1.2	15.5
46028	35.8N	121.7W	1.7	0.6	1.3	1.2	0.8	0.3	1.3	1.5	2.9	1.4	2.9	8.2	2.9	0.9	1.9	12.9	0.1	<.05	7.9	14.1	0.9	0.2	0.8	25.8
46029	46.2N	124.2W	0.4	0.2	1.4	1.1	0.3	0.6	1.3	0.3	2.1	5.0	10.6	1.8	1.1	2.9	8.7	9.3	1.0	5.3	20.6	1.7	8.9	7.4	6.4	4.4
46030	40.4N	124.5W	1.9	2.3	2.8	1.2	1.0	0.3	0.3	0.6	15.5	14.8	1.2	7.2	4.1	0.2	0.1	1.8	19.0	2.4	0.8	13.5	3.1			2.8
46031	55.5N	161.7W	1.9	0.5		0.8	0.4	0.8	2.0	1.5	0.6	0.5	1.5	1.5	4.5	2.9	2.3	5.8	2.8	0.7	0.9	3.8	15.7	3.0	4.2	7.2
46032	54.2N	165.8W									0.9	0.5	0.7	4.0	4.8	5.4	4.7	2.9	5.5	0.6	2.9	9.3	7.8	8.5	6.8	2.8
46033	55.8N	159.8W																				20.8	25.0	37.5		
46034	55.1N	163.1W									1.9	1.7	1.0	2.5	4.2	1.4	3.9	2.2	3.8	3.0	1.2	7.0	4.3	0.9	3.3	8.3
51001	23.4N	162.3W	0.5	0.3	0.3	0.9	0.3	0.1		0.1	7.1	4.2	4.7	6.3	2.1	1.2	1.2	0.7	7.5	10.0	27.2	4.4	4.9	5.6	2.0	2.1
51002	17.2N	157.8W									0.1	2.2	6.3	1.0						5.9	56.5	5.1				0.1
51003	19.2N	160.8W	0.8	0.9	2.4	1.3	1.0	0.2	0.2	0.5	1.6	5.6	13.1	8.3	3.4	2.1	0.8	0.3	0.2	5.5	35.5	10.7	4.1	0.5	0.1	
51004	17.5N	152.5W									0.3	1.5	5.3	0.3					0.1	16.9	61.2	1.6				
ALRF1	25.1N	080.7W									2.4	3.3	7.0							14.4	44.3	1.8				
ALSN6	40.5N	073.8W	0.4	1.2	1.5	1.2	0.4	0.4	0.9	0.9	3.1	4.9	3.6	1.1	0.1	1.4	2.7	5.3	4.9	3.6	7.6	3.4	1.3	5.6	9.9	15.4
BURL1	28.9N	089.4W	1.2	1.3	1.2	2.5	0.5	0.4	0.1	0.7	3.9	6.8	12.1	7.9	2.1	2.9	1.2	1.0	9.2	8.0	16.1	10.1	3.0	0.9	0.3	2.4
CARO3	43.1N	124.4W	1.9	1.6	4.7	6.0	3.3	0.1	0.9	0.3	3.3	6.6	5.1	21.3	10.7	2.1	1.1	1.4	6.0	5.3	0.1	2.5	6.0	2.7	1.6	1.9
CHLV2	36.9N	075.7W	1.4	0.1	1.3	0.2	0.3	0.9	0.7	1.6	4.4	9.4	4.0	1.1	1.1	6.2	6.0	3.0	5.4	8.9	5.4	1.5	2.9	9.7	8.6	3.8
CLKN7	34.6N	079.8W	1.9	0.9	0.1	0.8	1.0	1.3	1.8	2.2	11.1	7.7	0.5	0.1	2.6	15.2	13.5	6.3	4.8	6.9		0.6	0.9	10.1	3.7	2.6
CSBF1	29.7N	085.4W	4.2	10.6	13.2	0.5	2.6	1.8	1.5	3.1	2.8	6.3	24.9	3.5	5.2	3.7	1.8	3.5			0.2	<.05		0.1	0.2	0.3
DBLN6	42.6N	079.5W	0.6	0.6	1.6	1.1	3.7	1.9	1.7	0.8	0.6	1.3	4.7	5.0	12.8	5.7	2.9	0.5	0.3	2.9	0.5	1.9	3.0	12.2	6.5	1.1
DESW1	47.7N	124.5W	2.0	3.0	3.9	2.3	2.3	0.2	0.7	0.2	4.0	15.1	9.9	8.1	3.2	0.8	1.5	2.6	2.1	1.3	0.1	9.1	2.8	1.1	3.5	6.8
DISW3	47.1N	090.7W	0.3	0.2	0.8	1.3	1.4	<.05	0.1	1.3	2.4	2.1	3.2	4.9	7.5	2.3	4.9	2.9	1.8	8.2	4.4	0.7	3.0	9.8	15.5	5.3
DSLN7	35.2N	075.3W	0.9	0.4	0.4	0.1	0.1		0.5	1.8	7.0	3.4	0.7	0.5	0.1	2.2	9.3	7.7	12.9	3.3	0.1	2.6	1.3	7.0	12.8	6.6
FBIS1	32.7N	079.9W	5.3	3.7	3.0	1.3	2.3	4.2	10.4	4.9	6.9	6.8	2.6	0.6	1.0	17.8	10.6	3.9	0.8	6.3	1.6			0.6	0.4	0.5
FFIA2	57.3N	133.6W	1.8	2.5	1.4	0.9	1.5	0.3		0.1	6.1	4.4	1.4	5.1	7.5	0.2	0.1	0.8	14.2	0.9	1.1	17.8	8.6			0.6
FPSN7	33.5N	077.6W	3.0	0.6	0.1	0.3	0.3	1.2	0.5	3.5	8.7	2.6	0.5	0.4	0.9	2.5	10.3	5.4	6.1	6.7	1.3	1.6	8.0	16.1	11.6	3.3
GDIL1	29.3N	089.9W	0.5	1.9	4.0	3.3	0.3			0.9	0.9	5.2	27.3	22.7	5.7	3.0	0.5		3.8	7.9	9.0	5.6	0.5			
GLLN6	43.5N	076.3W	1.5	0.8	1.2	0.6	0.4	0.5	0.1	1.5	2.9	7.2	1.6	2.7	0.9	0.3	3.0	3.0	0.8	5.0	2.6	5.5	8.3	4.8	9.3	5.4
IOSN3	42.9N	070.6W	0.5	<.05	0.1	0.1	0.3	0.4	1.0	1.0	6.3	1.5	0.6	0.2	1.1	4.3	4.3	3.8	6.6	2.4	1.6	2.4	3.7	14.2	13.1	8.5
LKWF1	26.7N	080.0W	0.9	1.5	0.7	<.05	0.5	1.6	2.2	3.3	4.0	3.8	10.5	4.8	2.4	1.6	1.5	10.1	1.4	5.2	35.2	3.9	2.1	0.1		2.4
MDRM1	44.0N	068.1W	0.7	0.4	0.1	0.6		0.3	0.6	0.8	2.8	1.9	2.1	1.9	1.4	1.5	0.7	3.8	3.7	3.8	2.8	3.8	4.2	6.2	10.1	11.9
MISM1	43.8N	068.9W	0.2	0.8	0.4	0.3		0.3	0.7	0.5	1.2	1.6	1.8	2.3	0.9	0.6	2.6	3.8	2.7	2.5	2.5	3.7	4.3	7.2	10.0	11.6
NWPO3	44.6N	124.1W	0.1	2.7	0.5	2.0	0.8	0.3		0.5	2.1	5.2	26.0	3.2	2.2	3.1	3.0	2.4	2.3	<.05	12.0	<.05	0.7	7.8	5.3	4.4
PILM4	48.2N	088.4W	0.5	0.2	0.3	<.05	0.2	0.2	0.1	0.4	6.7	2.2	2.2	1.0	2.8	2.1	2.3	6.0	5.1	2.2	1.6	5.5	6.6	4.7	9.1	10.7
PTAC1	38.9N	123.7W	1.7	4.6	7.1	0.8	0.5	0.5	0.3	0.9	8.3	4.5	14.1	17.9	6.4	0.5	0.4	0.8	11.5	2.7	0.9	7.2	4.6	0.2		1.3
PTAT2	27.8N	097.1W	0.4	0.3	1.2	1.7	0.5	0.1		0.3	4.1	7.7	11.5	18.0	4.6	0.4	0.1	0.9	9.8	5.1	6.8	17.3	1.8	<.05	0.3	8.4
PTGC1	34.6N	120.7W	2.1	2.5	0.3	1.3	2.5	0.6	0.2	1.0	17.0	3.2	0.9	5.8	11.3	1.0		0.9	15.6	0.3	0.5	11.5	5.7	0.1		3.7
ROAM4	47.9N	089.3W	0.4							1.1	1.0	0.4				2.6	1.8	1.9	15.8	4.0	0.3		3.7	14.1	10.1	9.3
SBIO1	41.7N	082.8W	1.6	0.2	0.3	0.8	1.5	0.6	0.8	1.0	2.1	2.2	3.6	5.6	4.9	4.2	3.0	2.1	0.3	0.5	3.6	4.2	7.5	13.3	14.9	4.6
SGNW3	43.8N	087.7W	0.6	0.3		0.3	1.2	1.4	2.9	1.0	2.5	1.4	0.4	1.2	5.9	4.6	6.9	5.1	6.5	1.6	1.2	2.4	10.1	7.5	16.8	6.3
SISW1	48.3N	122.9W	2.6	2.3	2.3	1.4	0.1	0.5	0.5	0.7	7.4	10.6	8.0	9.1	5.1	1.9	3.3	2.7	3.7	4.8	3.5	9.5	4.4	0.5	4.1	0.6
SJLF1	30.4N	081.4W	5.2	5.8	3.1	3.0	2.2	2.6	2.1	2.3	11.7	10.8	4.9	4.1	4.6	10.3	11.7	3.7	5.3	3.2		<.05	0.1	0.2	0.3	2.8
SRST2	29.7N	094.1W	0.2	0.7	0.5	0.6	1.1	0.4	0.7	0.7	3.4	6.4	9.4	10.1	11.8	3.6	0.5	0.8	4.6	8.2	8.3	13.5	4.0	0.8		1.2
STDM4	47.2N	087.2W		0.1	0.1		0.4			0.1	1.3	1.6	2.7	1.5	0.9	0.8	1.2	1.7	7.0	1.8	2.0	3.0	6.2	6.4	6.7	13.1
TTIW1	48.3N	124.7W	0.2	1.8	2.2	0.9	0.4	0.1	1.5	0.4	0.4	1.0	6.5	1.8	5.3	0.4	1.1	3.8		0.9	12.2	6.9	4.2	0.3	8.5	2.6
WPOW1	47.7N	122.4W	1.4	5.8	3.3	3.5	3.6	3.2	1.6	1.0	8.0	6.4	3.0	5.2	9.5	9.4	2.2	0.8	6.7	0.7		1.5	13.3	2.4		

DECEMBER 1984			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
32301	-0. N	105.0W																								
41001	34.9N	072.9W	0.8		0.4	0.7	2.8	4.8	1.0	1.9				0.1	0.1	<.05	0.2	0.2								
41002	32.3N	075.3W				<.05	1.2	0.8	0.9	0.3																
41006	29.3N	077.3W						0.1		1.0																
42001	25.9N	089.7W	1.9	0.8	1.6	1.6	0.3			0.6																
42002	26.0N	093.5W	1.9	0.2	0.4	4.3	1.8																			
42003	26.0N	085.9W	1.8	0.2	2.0	1.2				0.9																
42007	30.1N	088.9W	0.6	0.9	0.4					0.1																
44004	38.5N	070.7W	1.5	1.1		0.6	1.1	5.9	6.2	4.3																
44005	42.7N	068.4W	0.1		0.2	1.1	0.1	0.8	5.0	1.4																
44007	43.5N	070.1W				0.4		1.5	1.3																	
44008	40.5N	069.4W																								
44009	38.5N	074.6W			0.7	0.2	0.7	1.4	0.8	2.0																
44011	41.1N	066.6W		0.4		0.6	0.9	0.3	4.1	1.5																
44012	38.8N	074.6W	1.1			0.7	0.1	1.0	0.6	3.2																
44013	42.4N	070.8W	0.3		0.6	0.3	0.1	0.4	2.4	0.3																
45002	45.3N	086.3W																								
45005	41.7N	082.5W						4.7	3.9	1.7																
46001	56.3N	148.3W			1.1	4.1	3.0	3.2	10.5	4.9																
46003	51.9N	155.7W		0.2	2.2	4.5	5.4	6.2	12.1	2.6					0.1	0.2	0.5									
46005	46.1N	131.0W	8.7	0.7	0.4	5.0	1.7	3.2	4.3	12.1	0.3			0.4				1.1								
46006	40.7N	137.7W	12.3	1.2		0.6	2.8	0.9	2.0	13.0					0.3											
46010	46.2N	124.2W			0.8		3.7	0.4	0.5	0.8																
46011	34.9N	120.9W	0.8		0.1	0.5	0.7	<.05		2.9								0.4								
46012	37.4N	122.7W	3.2	0.4	1.4	2.5	1.0			2.2	0.5							0.3								
46013	38.2N	123.3W				0.4				2.8																
46014	39.2N	124.0W	1.6			0.7				3.6																
46016	63.3N	170.3W	0.6	14.9	8.8	2.8	2.3	2.5				0.4		1.3			0.4			0.4						
46017	60.3N	172.3W	4.3	10.7	9.0	2.5	4.7	1.1	1.6	1.7	0.3	1.7		0.9	1.1	1.9		0.5								
46018	60.3N	177.0W	3.9	6.8	9.9	4.0	2.5	3.0	3.9	1.3	1.6	3.3	1.1	0.9	1.1	2.2	1.2									
46022	40.8N	124.5W				0.4	1.8	<.05																		
46023	34.3N	120.7W	0.5		1.7	0.8				12.1																
46024	32.8N	119.5W	0.5							4.1								0.6								
46025	33.6N	119.0W	0.6	0.1	0.3			0.1	0.2	2.8																
46026	37.8N	122.7W								5.2																
46028	35.8N	121.7W				1.4			0.1	6.0																
46029	46.2N	124.2W			0.1	0.2	2.8		0.4	0.4																
46030	40.4N	124.5W	0.4			2.1	0.2			0.6																
46031	55.5N	161.7W			0.6	8.5	14.2	2.2	4.1	4.6				0.5	1.5	0.1										
46032	54.2N	165.8W	2.5	0.5	1.9	10.1	5.4	2.4	1.9	5.0						0.5										
46033	55.8N	159.8W					16.7																			
46034	55.1N	163.1W	0.3	0.8	2.5	15.6	10.7	1.5	3.8	7.9			0.6	3.1	1.5		0.7	0.1								
51001	23.4N	162.3W		0.4	5.9		0.1																			
51002	17.2N	157.8W	0.7	0.2	21.7	<.05																				
51003	19.2N	160.8W		<.05	0.6	<.05																				
51004	17.5N	152.5W		4.8	8.0																					
ALRF1	25.1N	080.7W		7.7	19.0																					
ALSN6	40.5N	073.8W	1.7		1.1	2.1	0.3	0.3	3.1	9.8				0.7	0.1											
BURL1	28.9N	089.4W	1.0	0.5						2.7																
CARO3	43.1N	124.4W	0.2	<.05			2.3	0.7	0.4																	
CHLV2	36.9N	075.7W	3.2	0.5	0.7	0.6	1.4	7.5	1.4	0.7	0.1							<.05								
CLKN7	34.6N	079.8W			1.9	0.4			0.2	0.7																
CSBF1	29.7N	085.4W																								
DBLN6	42.6N	079.5W		0.2		0.3		10.5	11.9	0.2						2.1	0.9	<.05								
DESW1	47.7N	124.5W	0.5	0.2	0.2	5.9	2.6	0.3	0.3	3.9					0.2	0.1	0.1	<.05								
DISW3	47.1N	090.7W	0.9	0.3	0.5		0.2	6.0	8.2	2.0						0.4	0.5									
DSLN7	35.2N	075.3W	2.0	1.1	3.8	0.6	0.9	6.9	3.6	1.0			0.1	0.2	0.4	0.1	0.2	0.1								
FBIS1	32.7N	079.9W		0.3	0.2																					
FFIA2	57.3N	133.6W	10.8	0.2		0.6	0.4			1.0	3.9							0.7								
FPSN7	33.5N	077.6W	0.4	4.0		0.5	0.3	2.5	1.2	1.5							0.3									
GDIL1	29.3N	089.9W																								
GLLN6	43.5N	076.3W				2.9	0.4	3.4	13.4	0.8				0.2	0.2	<.05	0.9									
IOSN3	42.9N	070.6W	2.0	0.3	1.7	1.2	0.9	6.0	6.6	2.8			0.2	<.05			0.1									
LKWF1	26.7N	080.0W																								
MDRM1	44.0N	068.1W	1.7	0.2	1.1	1.7	2.5	6.6	8.1	8.4	0.2		0.5	0.6		0.3	0.3	1.3				0.1				
MISM1	43.8N	068.9W	0.3	1.1	1.7	2.1	1.9	9.2	8.5	6.4			0.7	0.4		1.3	3.0	0.7				0.1				
NWPO3	44.6N	124.1W					1.7	1.4	0.5	1.8					0.2	<.05										
PILM4	48.2N	088.4W		0.9	0.6	2.8	0.7	4.0	13.0	3.7						0.3	0.8	0.4								
PTAC1	38.9N	123.7W	2.4																							
PTAT2	27.8N	097.1W	3.6	0.5			0.1	<.05		0.3																
PTGC1	34.6N	120.7W	3.9			1.4	0.5			3.4	1.4							1.5								
ROAM4	47.9N	089.3W	7.9	1.7			1.9	5.6	7.5	4.3	1.4	1.1				1.2	1.2									
SBIO1	41.7N	082.8W					1.6	4.0	8.1	2.9																
SGNW3	43.8N	087.7W	1.4	1.5	0.9	2.8	1.2	1.5	1.6	0.9						0.1										
SISW1	48.3N	122.9W	1.6	0.7		4.1	2.4		0.3			0.1														
SJLF1	30.4N	081.4W																								
SRST2	29.7N	094.1W																								
STDM4	47.2N	087.2W	3.5	0.1	0.4	2.5	8.6	1.3	6.8	12.4	1.3				0.5		0.7	3.1								
TTIW1	48.3N	124.7W		0.1	15.8	0.6	4.7		3.7	1.4		0.3	7.3		2.9	0.3										
WPOW1	47.7N	122.4W	1.4	<.05			3.9	<.05																		

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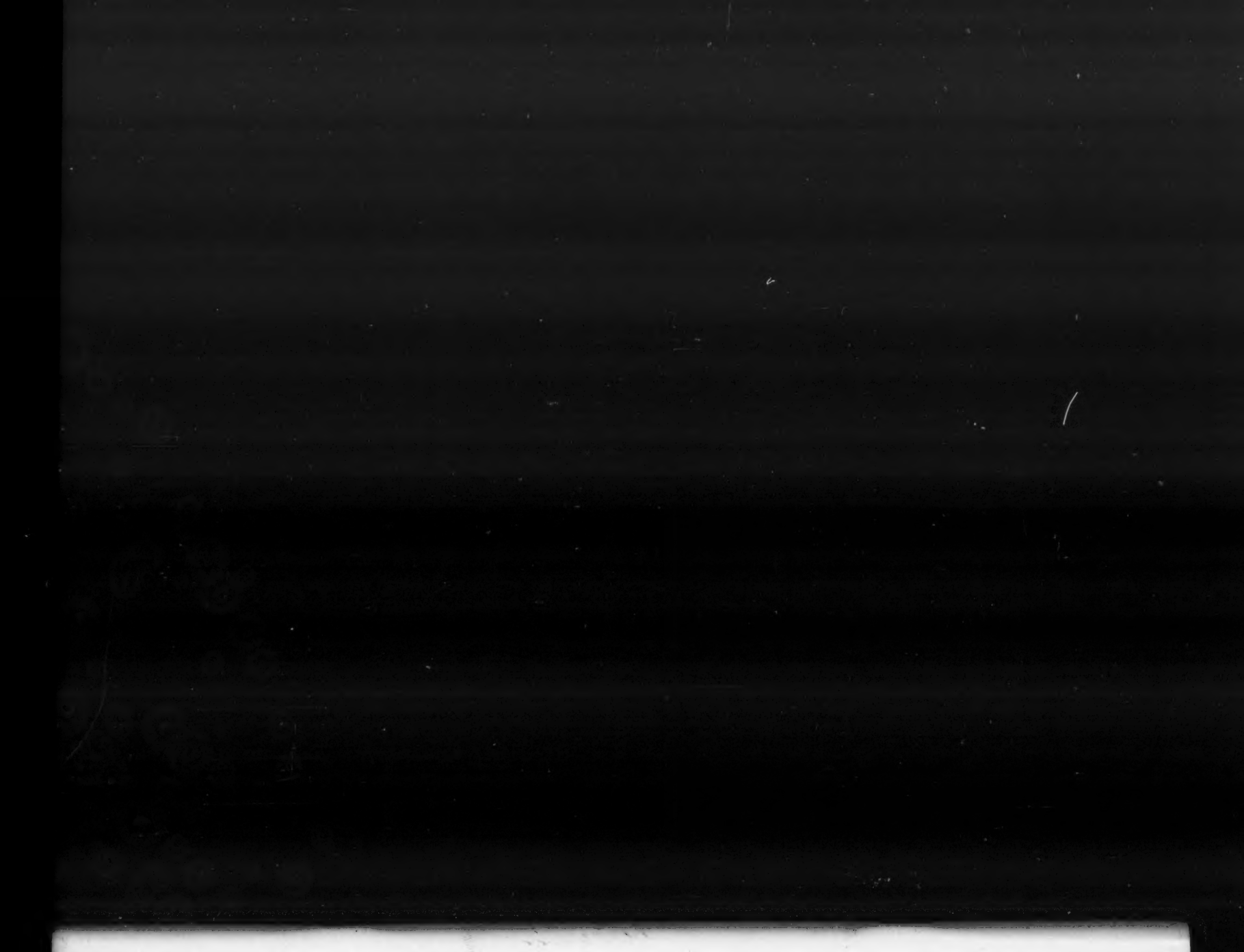
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